

## REVISION OF THE MIOCENE CAVIOMORPH RODENTS FROM THE RÍO SANTA CRUZ (ARGENTINEAN PATAGONIA)

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# REVISION OF THE MIOCENE CAVIOMORPH RODENTS FROM THE RÍO SANTA CRUZ (ARGENTINEAN PATAGONIA)

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**Abstract.** Fossil rodents from the Río Santa Cruz (RSC) classic localities (Santa Cruz Formation, Early–Middle Miocene) are known by the works of F. Ameghino and W.B. Scott since the end of the 19<sup>th</sup> and beginning of the 20<sup>th</sup> centuries. These caviomorph rodents have not been comprehensively reviewed since then. In this contribution, we studied new fossil specimens from the cliffs of the RSC (Province of Santa Cruz, Argentina) collected with accurate stratigraphic and geographic data during fieldtrips in 2013 and 2014. An increase in the caviomorph taxonomic richness is observed, based upon our taxonomic study of caviomorphs previously recorded in the RSC. Also, these fieldworks recovered for the first time several taxa previously found in other Santacrucian and even older Patagonian localities (Colhuehuapian, Early Miocene). As a general evolutionary pattern, we note an increase of derived euhypsodont taxa (*Prolagostomus*, *Pliolagostomus*, *Schistomys*, and *Eocardia*) in Segundas Barrancas Blancas (16.47–15.3 Ma). In addition, a taxonomic replacement of *Phanomys* by *Schistomys* is noted between Barrancas Blancas (17.21–16.3 Ma) and Segundas Barrancas Blancas, as well as a notably increase in the abundance of the large *Perimys onustus* in the latter locality. The present study provides a revision of the caviomorph systematics, and intends to be the starting point to understand the diversity (in all its aspects) and the evolution of this group during the Santacrucian, a major event in the South American mammalian history.

**Key words.** Santacrucian. Province of Santa Cruz. Hystricognathi. Taxonomy. Systematics. Biostratigraphy. Evolution.

**Resumen.** REVISIÓN DE LOS ROEDORES CAVIOMORFOS MIOCENOS DEL RÍO SANTA CRUZ (PATAGONIA ARGENTINA). Los roedores fósiles provenientes de localidades del Río Santa Cruz (RSC; Formación Santa Cruz, Mioceno Temprano–Medio) se conocen desde fines del siglo 19 y principios del 20, gracias a los trabajos de F. Ameghino y W.B. Scott. Sin embargo, no fueron estudiados a nivel integral desde ese momento. En este sentido, analizamos nuevos ejemplares recolectados en las barrancas del RSC (Santa Cruz, Argentina) durante los años 2013 y 2014 que cuentan con datos de procedencia estratigráfica y geográfica precisos. El estudio taxonómico permitió reconocer taxones previamente descriptos para el RSC, así como nuevos taxones conocidos en otras localidades santacrucenses o en localidades más antiguas de Patagonia (Colhuehuapense, Mioceno Temprano). Se corroboró un aumento en la riqueza taxonómica del conjunto de roedores del RSC. Como patrón evolutivo general, se observa un incremento de formas euhipsodontes derivadas (*Prolagostomus*, *Pliolagostomus*, *Schistomys*, *Eocardia*) en Segundas Barrancas Blancas (16,47–15,3 Ma). A su vez, observamos un reemplazo taxonómico de *Phanomys* por *Schistomys* desde la localidad de Barrancas Blancas (17,21–16,3 Ma) a Segundas Barrancas Blancas y un notable aumento en la abundancia de *Perimys onustus*, la especie más grande del género, en esta última localidad. El presente estudio es una puesta al día de la sistemática de los caviomorfos del RSC y pretende ser el punto de partida para entender la diversidad y la evolución de los caviomorfos durante el Santacrucense, un periodo crucial en la historia de los mamíferos sudamericanos.

**Palabras clave.** Santacrucense. Provincia de Santa Cruz. Hystricognathi. Taxonomía. Sistemática. Bioestratigrafía. Evolución.

CAVIOMORPHS are the endemic hystricognath rodents of Central and South America (Wood, 1955; Upham and Patterson, 2015). They constitute the most diverse group of rodents from a morphological and ecological point of view, and have a long evolutionary history during the Cenozoic (Vassallo and Antenucci, 2015; Vucetich *et al.*, 2015). The systematics and biology of extant taxa have been intensively studied and

are relatively well-known (Álvarez *et al.*, 2011; Patton *et al.*, 2015; Vassallo and Antenucci, 2015). However, these aspects still require intensive study in fossils. In this regard, the Early Miocene represents a crucial moment in the evolutionary history of caviomorphs since the fossil record indicates that Santacrucian rodents were a critical part of an important caviomorph diversification (Pérez and Pol, 2012;

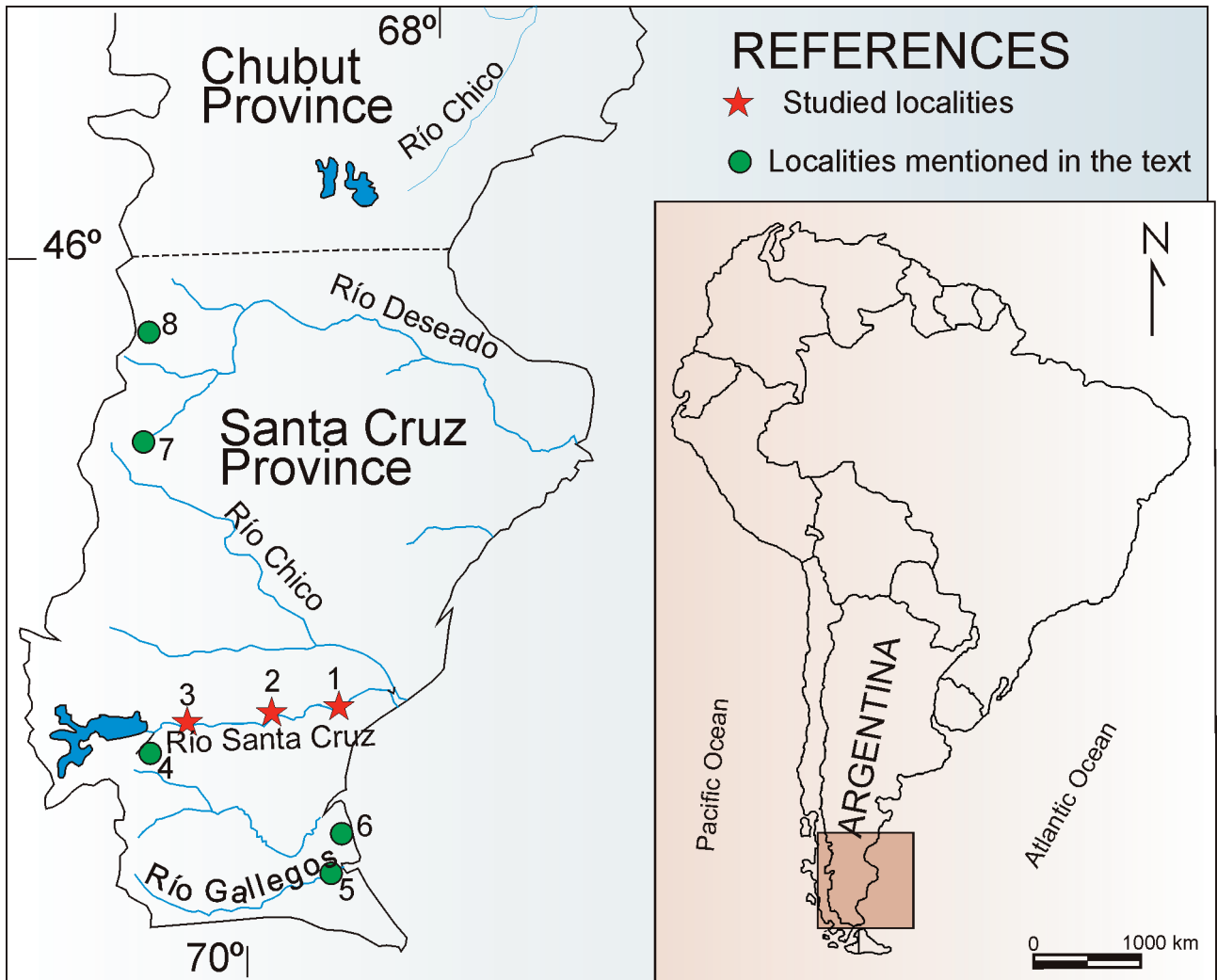
Arnal and Vucetich, 2015a; but see Verzi *et al.*, 2014). The Early–Middle Miocene of Patagonia (Colhuehuapian, “Pinturan”, Santacrucian, and “Colloncuran” South American Land Mammal Ages, SALMA), has yielded an excellent record of mammals (*e.g.*, Ameghino, 1887a,b, 1889; Scott, 1905; Kramarz, 2001, 2002, 2004, 2006a,b; Kramarz *et al.*, 2010, 2013; Pérez, 2010a; Pérez *et al.*, 2010; Vucetich *et al.*, 2010; Pérez and Vucetich, 2012; Vizcaíno *et al.*, 2012a; Arnal and Pérez, 2013; González Ruiz *et al.*, 2013, 2017; Brandoni *et al.*, 2017, 2019; Vera *et al.*, 2017, 2018; Busker *et al.*, 2018; Rasia and Candela, 2019). In particular, the Santa Cruz Formation (Early–Middle Miocene; Santacrucian) is widely distributed in the Province of Santa Cruz, Argentina (Fig. 1; Cuitiño *et al.*, 2016, 2019). It is one of the richest Cenozoic vertebrate fossil units bearing abundant and well-preserved specimens. Caviomorphs recorded in the cliffs of the classic localities of the Río Santa Cruz (RSC; Fig. 1) were first studied by F. Ameghino (1887a,b, 1889, 1891a,b, 1894) who erected 23 caviomorph genera and 45 species (Tab. 1). These rodents were later revised by Scott (1905) who described new species from other Santacrucian localities of the Province of Santa Cruz (Fig. 1), but no new caviomorph genera were identified. In this regard, Scott (1905, p. 384) stated: “*It must not be supposed that the full number of Santa Cruz genera has been already discovered, though it is improbable that the list will be very greatly extended in the future*”. Since that time, several other Santacrucian-age localities have been identified at high and middle latitudes of South America. However, caviomorphs have been listed or mentioned in only some of them: coastal localities in the Province of Santa Cruz (Tauber, 1997; Candela *et al.*, 2012), Las Hornillas, Province of San Juan, Argentina (López *et al.*, 2011), Alto Río Cisnes (Marshall and Salinas, 1990), Pampa Castillo (Flynn *et al.*, 2002), Laguna del Laja (Flynn *et al.*, 2008), and Sierra Baguales (Bostelmann *et al.*, 2013) of southern Chile, and Chucal of northern Chile (Croft *et al.*, 2004). In agreement with Scott’s conclusion, almost no new taxa were formally recognized since Ameghino’s work (but see Arnal and Vucetich, 2015b).

Santacrucian rodents are very abundant in number of specimens but relatively homogeneous in their morphological disparity (Scott, 1905; Vucetich *et al.*, 2015). When compared with rodents from the lower and middle sequences of

the Pinturas and Sarmiento formations (“Pinturan” and Colhuehuapian SALMAS, Early Miocene), those from beds of the Santa Cruz Formation show some differences. Santacrucian octodontoids are characteristically more hypsodont and more lophate than their predecessors; euhypsodont cavioids predominate for the first time; erethizontoids are less abundant and less diverse, and chinchilloids reach their greatest diversity (Vucetich *et al.*, 2015, and literature therein). The dental changes toward increasing hypsodonty and trend towards more simplified occlusal surfaces were traditionally related to the environmental and climatic changes that occurred since the Late Eocene–Early Oligocene, which were more marked in Patagonia at that time (Pascual *et al.*, 1996; Zachos, 2001; Ortiz Jaureguizar and Cladera, 2006; Madden, 2015; Vizcaíno *et al.*, 2012a).

Despite the importance of this rodent fauna owing to their excellent fossil record and widespread geographical distribution, no comprehensive studies of the caviomorph assemblages either from the RSC or from other Santacrucian localities have been performed to date. Only partial revisions or isolated studies of specimens from different Santacrucian localities have been published (Pérez, 2010b; Arnal, 2012; Pérez and Vucetich, 2012; Arnal and Vucetich, 2015b; Arnal *et al.*, 2017).

A particular problem of this fauna is that the abundant fossil remains found by Carlos Ameghino in the RSC and other localities lack accurate geographic and stratigraphic data, which makes comparisons between localities and biostratigraphic correlations difficult (Fericola *et al.*, 2019). Since those first collections, almost no new intensive field work had been made to remedy this deficiency. At the beginning of the 21<sup>st</sup> century a group of scientists headed by Drs. S.F. Vizcaíno, M.S. Bargo (Museo de La Plata, MLP), R.F. Kay (Duke University, USA), and J.C. Fericola (Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”), launched a project focused on the Santa Cruz rocks (Santa Cruz Formation, Early–Middle Miocene) cropping out along the Atlantic coast of the Province of Santa Cruz, and along the cliffs on the southern bank of the RSC. Within this project, numerous new specimens with good stratigraphic provenance were collected (Vizcaíno *et al.*, 2012a; Fericola *et al.*, 2014, 2019; Cuitiño *et al.*, 2016), which considerably



**Figure 1.** Location map showing the Santacrucian and other localities mentioned in the text. 1, Barrancas Blancas (BB); 2, Segundas Barrancas Blancas (SBB); 3, Yaten Huageno (YH); 4, Río Bote; 5, Killik Aike; 6, Guer Aike; 7, río Pinturas area; 8, río Jeinemeni area.

enlarge the Santacrucian caviomorph collections and allow integral studies of the whole Santacrucian assemblage to be performed. Furthermore, on the basis of a systematic revision and owing to the precise provenance data, different Santacrucian localities bearing rodents can now be harnessed in the search for evolutionary trends related to climatic and environmental changes. In this contribution, a revision of the caviomorph rodents from the Santa Cruz Formation at the RSC is performed, including new specimens. Their taxonomic richness is compared with those from other Santacrucian localities of the Province of Santa Cruz (Scott, 1905; Candela *et al.*, 2012; Fernicola *et al.*, 2019). Additionally, general evolutionary trends of the group are also discussed.

## MATERIALS AND METHODS

More than 750 fossil specimens (Appendix 1) housed at the Vertebrate Paleontology Collection of the Museo Regional Provincial “Padre Manuel Jesús Molina” (MPM-PV) were studied. Several Santacrucian caviomorphs specimens were used for comparison, mainly those housed at the American Museum of Natural History (AMNH), New York, USA; Field Museum of Natural History (FMNH), Chicago, USA; Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Ameghino National Collection (MACN-A), Buenos Aires, Argentina; Museo de La Plata, La Plata, Argentina (MLP); Museum National d’Histoire Naturelle (MNHN), Paris, France; Museo Paleontológico Egidio Feruglio (MPEF-PV),



TABLE 1 - Caviomorph rodents from the Río Santa Cruz described by Ameghino

<i>Ameghino, 1887a</i>	<i>Ameghino, 1887b</i>	<i>Ameghino, 1889</i>	<i>Ameghino, 1891a,b</i>	<i>Ameghino, 1902</i>	<i>Current taxonomy</i>
<i>Acaremys murinus</i>					<i>Acaremys murinus</i> <sup>1</sup>
		<i>Acaremys messor</i>			<i>Acaremys messor</i> <sup>1</sup>
<i>Acaremys minutus</i>					<i>Acarechimyus minutus</i> <sup>2</sup>
<i>Acaremys minutissimus</i>					<i>Acarechimyus minutissimus</i> <sup>2</sup>
<i>Sciamys principalis</i>					<i>Sciamys principalis</i>
<i>Sciamys varians</i>					<i>Sciamys varians</i>
<i>Adelphomys candidus</i>					<i>Adelphomys candidus</i>
<i>Stichomys regularis</i>					<i>Stichomys regularis</i>
<i>Stichomys constans</i>					<i>Acarechimyus constans</i> <sup>2</sup>
<i>Spaniomys riparius</i>					<i>Spaniomys riparius</i>
<i>Spaniomys modestus</i>					<i>Spaniomys modestus</i>
					<i>Acarechimyus gracilis</i> <sup>2</sup>
					<i>Pseudoacaremys kramarzii</i> <sup>1</sup>
					<i>Sciamys latidens</i> <sup>3</sup>
					<i>Dudumus sp. nov.</i> <sup>2,3</sup>
					<i>Prospaniomys sp. nov.</i> <sup>2,3</sup>
<i>Steiromys detentus</i>					<i>Steiromys detentus</i>
<i>Steiromys duplicatus</i>					<i>Steiromys duplicatus</i>
<i>Neoreomys australis</i>					<i>Neoreomys australis</i> <sup>4</sup>
<i>Neoreomys indivisus</i>					
<i>Neoreomys decisis</i>					
		<i>Neoreomys insulatus</i> <sup>4</sup>			
	<i>Eocardia montana</i>				<i>Eocardia montana</i> <sup>5</sup>
<i>Eocardia divisa</i>					
<i>Eocardia perforata</i>					
			<i>Dicardia excavata</i> <sup>b</sup>		" <i>Eocardia</i> " <i>excavata</i> <sup>5</sup>
			<i>Eocardia fissa</i> <sup>a</sup>		" <i>Eocardia</i> " <i>fissa</i> <sup>5</sup>
<i>Schistomys erro</i>					<i>Schistomys erro</i>
<i>Phanomys mixtus</i>					<i>Phanomys mixtus</i>
			<i>Phanomys vetulus</i> <sup>a</sup>		<i>Phanomys vetulus</i>
<i>Hedymys integrus</i>					<i>Nomen nudum</i> <sup>6</sup>
<i>Perimys erutus</i>					<i>Perimys erutus</i> <sup>7</sup>
		<i>Perimys procerus</i>			
<i>Sphodromys scalaris</i>					
<i>Perimys onustus</i>					<i>Perimys onustus</i>
			<i>Perimys planaris</i> <sup>a</sup>		
				<i>Perimys incavatus</i>	<i>Perimys incavatus</i> <sup>3</sup>
<i>Sphiggomys zonatus</i>					<i>Perimys zonatus</i> <sup>8</sup>
		<i>Olenopsis uncinus</i> <sup>9</sup>			
<i>Prolagostomus pusillus</i>					<i>Prolagostomus pusillus</i> <sup>10</sup>
<i>Prolagostomus divisus</i>					
<i>Prolagostomus profluens</i>					
<i>Prolagostomus imperialis</i>					
		<i>Lagostomus lateralis</i>			
		<i>Lagostomus primigenius</i>			
<i>Sphaeromys irruptus</i> <sup>11</sup>					
<i>Scotaeumys imminutus</i> <sup>12</sup>					
<i>Pliolagostomus notatus</i>					<i>Pliolagostomus notatus</i> <sup>13</sup>
<i>Scleromys angustus</i>					<i>Scleromys angustus</i>
<i>Calladontomys vastatus</i>					<i>Nomen dubium</i> <sup>14</sup>

<sup>1</sup>Arnal and Vucetich (2015b); <sup>2</sup>Arnal et al. (2017); <sup>3</sup>this work; <sup>4</sup>Kramarz (2006b); <sup>5</sup>Pérez (2010b); <sup>6</sup>sensu Wood and Patterson (1959); <sup>7</sup>Kramarz (2002);<sup>8</sup>Ameghino (1894) transferred this species to *Perimys zonatus*; <sup>9</sup>Candela and Nasif (2006) synonymized this species with *Neoreomys*; <sup>10</sup>Rasia (2016);<sup>11</sup>Scott (1905) synonymized this species with *Prolagostomus pusillus*; <sup>12</sup>Kramarz (2002) synonymized this species with *Prolagostomus*; <sup>13</sup>Rasia andCandela (2019); <sup>14</sup>Mones.

Trelew, Argentina; and Princeton University Collection of the Yale Peabody Museum (YPM-PU), New Haven, USA.

Caviomorph systematics follow Pérez (2010a,b), Arnal (2012), Arnal and Vucetich (2015b), Rasia (2016), and references in Table 1.

The studied localities along the southern banks of the RSC are, from East to West (Fernicola *et al.*, 2014; Cuitiño *et al.*, 2016, 2019) (Fig. 1): Barrancas Blancas (BB; 17.21–16.3 Ma), with two sites, Estancia Aguada Grande (EAG) and Estancia Santa Lucía (ESL); Segundas Barrancas Blancas (SBB; 16.47–15.3 Ma), with three sites, Estancia Cordón Alto1 (ECA), Estancia Cordón Alto2 (ECA2), and Estancia el Tordillo (EET); Yaten Huageno (YH; 17.21–16.68 Ma) with one site, Estancia El Refugio (EER).

## SYSTEMATIC PALEONTOLOGY

Order RODENTIA Bowdich, 1821

Suborder HYSTRICOGNATHI Tullberg, 1899

Superfamily OCTODONTOIDEA Waterhouse, 1839

Genus *Spaniomys* Ameghino, 1887a

**Type species.** *Spaniomys riparius* Ameghino, 1887a. Pinturas Formation, Early Miocene and Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

*Spaniomys riparius* Ameghino, 1887a

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

*Spaniomys* sp.

Figure 2.1–4

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

**Comments.** *Spaniomys* is characterized by being higher crowned than *Acaremys* Ameghino, 1887a and *Acarechimys* Patterson in Kraglievich, 1965. Cheek teeth have planar occlusal surfaces and undifferentiated cusps (Fig. 2.1–3), unlike *Acarechimys*, but resembling *Adelphomys* Ameghino, 1887a and *Stichomys* Ameghino, 1887a. This genus retains the deciduous premolar through life, unlike *acaremyids*

(= *Acaremys*, *Sciamys* Ameghino, 1887a, *Pseudoacaremys* Arnal and Vucetich, 2015b, *Galileomys* Vucetich and Kramarz, 2003, and *Platypittamys* Wood, 1949; Arnal and Vucetich 2015b). Lophs and lophids are thin with pointed labial and lingual ends respectively, unlike *Adelphomys* and *Stichomys*. Lower cheek teeth have four lophids (MPM-PV 20178; Fig. 2.1–2) and upper cheek teeth have four (MPM-PV 20310; Fig. 2.3) or five lophs.

Ameghino recognized three species: *S. riparius*, *S. modestus* Ameghino, 1887a, and *S. biplicatus* Ameghino, 1894 that differ in size and in the number of flexi on lower cheek teeth. However, size differences are not great. In this work, several well-preserved specimens were recognized as *S. riparius* owing to their slightly larger size (MPM-PV 20115, MPM-PV 20524, MPM-PV 20557; Appendix 1; Tab. 2), but most of them (Fig. 2.1–4) were recognized as *Spaniomys* sp. (MPM-PV 20562; MPM-PV 20618; MPM-PV 20770; Appendix 1; Tab. 2) until a systematic revision is performed. Within the new rodents sample, *Spaniomys* is present and abundant in EAG and ESL (BB) and ECA, ECA2, and EET (SBB). In EER (YH) rodents are very scarce, but it is represented by one specimen (MPM-PV 20770; Tab. 2).

Genus *Stichomys* Ameghino, 1887a

**Type species.** *Stichomys regularis* Ameghino, 1887a. Pinturas Formation, Early Miocene, and Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz; Río Frías Formation, Middle Miocene, Province of Chubut.

*Stichomys regularis* Ameghino, 1887a

Figure 2.5–6, 9–10

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

*Stichomys* sp.

Figure 2.7–8

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

*Stichomys?* sp.

TABLE 2 - Caviomorph rodents reported in this contribution with a comparison of the taxonomic richness between the Río Santa Cruz localities

<i>Taxa</i>	<i>n</i>	<i>BB</i>	<i>n</i>	<i>SBB</i>	<i>n</i>	<i>YH</i>
<i>Octodontoidea</i>	<i>Spaniomys riparius</i>	X	1	X	6	
	<i>Spaniomys sp.</i>	X	18	X	38	X 1
	<i>Stichomys regularis</i>			X	14	X 1
	<i>Stichomys sp.</i>	X	7	X	28	
	<i>Acarechimys minutus</i>			X	5	
	<i>Acarechimys minutissimus</i>	X	1	X	14	
	<i>Acarechimys constans</i>			X	7	
	<i>Acarechimys gracilis</i>			X	6	
	<i>Dudumus sp. nov.?</i>			X	1	
	<i>Prospaniomys sp. nov.?</i>	X	1	X	2	
	<i>Acaremys murinus</i>			X	2	
	<i>Acaremys sp.</i>	X	2	X	1	
	<i>Sciamys principalis</i>	X	2	X	10	
	<i>Sciamys latidens</i>			X	1	
	<i>Sciamys sp.</i>	X	1	X	4	
<i>Erethizontoidea</i>	<i>Steiromys detentus</i>	X	1	X	5	
	<i>Steiromys duplicatus</i>	X	11	X	1	
	<i>Steiromys sp.</i>	X	2			
<i>Cavioidea</i>	<i>Neoreomys australis</i>	X	51	X	66	X 1
	<i>Phanomys mixtus</i>	X	13			
	<i>Phanomys sp.</i>			X	4	
	<i>Eocardia montana</i>	X	8	X	22	
	" <i>Eocardia</i> " <i>excavata</i>	X	5	X	4	
	<i>Eocardia sp.</i>	X	22	X	32	
	<i>Schistomys erro</i>			X	3	
<i>Chinchilloidea</i>	<i>Prolagostomus pusillus</i>			X	34	
	<i>Prolagostomus sp.</i>	X	2	X	80	
	<i>Pliolagostomus notatus</i>			X	37	
	<i>Perimys erutus</i>	X	11	X	3	
	<i>Perimys onustus</i>	X	1	X	23	
	<i>Perimys incavatus</i>	X	1			
	<i>Perimys sp.</i>	X	7	X	6	
	<i>Scleromys sp.</i>	X	8	X	4	

BB, barrancas Blancas; SBB, Segundas Barrancas Blancas; YH, Yaten Huageno; n, number of specimens (see Appendix 1). \*Dubious taxa (?) are not included in the table.

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

*Stichomys sp./Adelphomys sp.*

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

**Comments.** *Stichomys* is characterized by being relatively

high-crowned, resembling *Adelphomys* and *Spaniomys* in this respect. It has derived cheek teeth with planar occlusal surfaces, undifferentiated cusps, and retention of the deciduous premolars through life (Fig. 2.5–10), also as in *Adelphomys* and *Spaniomys*. Nevertheless, their cheek teeth have broader lophs/ids with rounded end tips (Fig. 2.5–7 and 2.9), as *Adelphomys* and unlike *Spaniomys*. Upper molars with four lophs and lowers with three main lophs, as

in *Adelphomys* and *Spaniomys*. *Adelphomys* is very similar to *Stichomys*. The two genera differ in that the former has planar anterior face on the incisors and the latter convex ones (Ameghino, 1887a). In general terms, *Stichomys* is more abundant than *Adelphomys* (convex incisors are more abundant than planar incisors; see Appendix 1). Nevertheless, in the new rodent collection several specimens have no incisors preserved, and thus, they could not be recognized at generic level. These specimens were referred to as *Stichomys* sp./*Adelphomys* sp. (MPM-PV 20356, MPM-PV 20550; Appendix 1).

Seven species of *Stichomys* were described (Ameghino, 1887a, 1891a). Three of them were transferred to *Acarechimys* (Arnal et al., 2017). The remaining species require taxonomic revision. At present, we recognize several large and well-preserved specimens as *S. regularis* (Fig. 2.5–6, 9–10), but the remaining specimens only as *Stichomys* sp. (MPM-PV 20415; Fig. 2.7–8).

Within the new rodent sample *Stichomys* is the most abundant octodontoid with more than 60 specimens (Appendix 1). We identified *Stichomys regularis*, *Stichomys* sp., *Stichomys* sp./*Adelphomys* sp., and *Stichomys?* sp. (Appendix 1). These taxa are more abundant in ECA, ECA2, and EET (SBB), while in BB (ESL and EAG) they are only represented by three specimens recognized as *Stichomys* sp. (Tab. 2). In EER (YH) there is one specimen recognized as *Stichomys regularis* (MPM-PV 20771). The phylogenetic relationships of *Stichomys* and *Adelphomys* are not clear. Based on the dental morphology they have been included in “Adelphomyinae”, an echimyid fossil lineage (Wood and Patterson, 1959; Kramarz, 2001). Nevertheless, most phylogenetic analyses (Arnal et al., 2014; Arnal and Vucetich, 2015a; Verzi et al., 2014) do not recover this clade. In fact, both *Stichomys* and *Adelphomys*, together with *Spaniomys* and other fossil octodontoids (i.e., *Eodelphomys* Frailey and Campbell, 2004 from the late Eocene of Peru and *Xylechimys* Patterson and Pascual, 1968 from the late Oligocene of Patagonia), represent a basal radiation of crown-octodontoids (Arnal and Vucetich, 2015a).

Genus *Acarechimys* Patterson in Kraglievich, 1965

**Type species.** *Acaremys minutus* Ameghino, 1887a. Santa Cruz

Formation, Early–Middle Miocene, Province of Santa Cruz; Collon Curá Formation, early Middle Miocene, Province of Neuquén; unnamed formation, late Middle Miocene, Quebrada Honda, Bolivia.

*Acarechimys minutus* (Ameghino, 1887a)

Figure 2.11–13

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

*Acarechimys minutissimus* (Ameghino, 1887a)

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

*Acarechimys constans* (Ameghino, 1887a)

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

*Acarechimys gracilis* (Ameghino, 1891)

Figure 2.14–15

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

**Comments.** *Acarechimys* was a successful evolutionary lineage of octodontoids with brachyodont cheek teeth, thin loph/lophids, and identifiable cusps, unlike *Stichomys*, *Adelphomys*, and *Spaniomys*. It retained the deciduous premolars through life (Fig. 2.11, 14), unlike acaremyids. Upper cheek teeth have four lophs (Fig. 2.11) and lowers have three main lophids with another variably developed (Fig. 2.14; Arnal et al., 2017). This genus represents the octodontoid with the widest temporal (Late Oligocene–Late Miocene) and geographic distribution (southern Argentinean Patagonia to Colombia), reaching its maximum recorded diversity in the Santacrucian (Arnal et al., 2017). Five species are recognized: *A. leucotheae* Vucetich et al., 2014 (Late Oligocene, Province of Chubut), *A. minutus*, *A. minutissimus* (Early–Middle Miocene of Argentinean Patagonia, Bolivia, and Colombia), *A. constans* and *A. gracilis* (Early–Middle Miocene, provinces of Chubut and Santa Cruz, Argentina). For detailed descriptions of the species see Arnal et al. (2017).

*Acarechimys* is represented in all the stratigraphic levels of SBB (Appendix 1). Four of the five known species are recorded: *A. minutus* (MPM-PV 15088, MPM-PV 15089; Fig. 2.11–13), *A. minutissimus* (MPM-PV 15100, MPM-PV 20069, MPM-PV 20346; see Appendix 1), *A. constans* (MPM-PV 15093, MPM-PV 15096, MPM-PV 20637; see Appendix 1), and *A. gracilis* (MPM-PV 17430; Fig. 2.14–15). On the other hand, only one specimen of *A. minutissimus* is recorded in BB (MPM-PV 20069; EAG-80 mts) and none in YH.

#### Genus *Dudumus* Arnal *et al.*, 2014

**Type and only species.** *Dudumus ruigomezi* Arnal *et al.*, 2014. Sarmiento Formation, Trelew Member, Early Miocene, Province of Chubut.

#### *Dudumus* sp. nov.?

Figure 2.16

**Referred material.** MPM-PV 20561, right M1-M2.

**Locality and horizon.** Segundas Barrancas Blancas (ECA2), Río Santa Cruz, Province of Santa Cruz, Early–Middle Miocene.

**Comments.** One small maxillary fragment with M1-M2 is here assigned to *Dudumus* sp. nov.?. The molars are bunolophodont, brachydont, and slightly terraced (Fig. 2.16), as in *Dudumus ruigomezi* and *Caviocricetus* Vucetich and Verzi, 1996. As in *Dudumus ruigomezi* and *Caviocricetus*, the third loph, interpreted as a mesolophule, is shorter than the remaining lophs and does not reach the metacone. The length of this crest and the degree of terracing in the molars are more similar in these respects to *Dudumus ruigomezi* than to *Caviocricetus*. Nevertheless, the new specimen has different teeth proportions and therefore is here interpreted as a possible new species.

MPM-PV 20561 (Fig. 2.16) was found in ECA2 of SBB locality (Tab. 2). It represents the first record of *Dudumus* for the Santa Cruz Formation, since it was previously known for Colhuehuapian (Early Miocene) of the Province of Chubut.

#### Genus *Prospaniomys* Ameghino, 1902

**Type species.** *Prospaniomys priscus* Ameghino, 1902. Sarmiento Formation, Early Miocene, Province of Chubut.

#### *Prospaniomys* sp. nov.?

Figure 2.17–18

**Referred materials.** See Appendix 1.

**Locality and horizon.** Barrancas Blancas (ESL) and Segundas Barrancas Blancas (ECA2), Río Santa Cruz, Province of Santa Cruz, Early–Middle Miocene.

**Comments.** Three bunolophodont specimens are identified as *Prospaniomys* sp. nov.?. MPM-PV 20294 (Fig. 2.17) is a right maxillary fragment with DP4-M1 and MPM-PV 20560 is an isolated upper molar. These cheek teeth have four lophs of which the anterior most (= anteroloph) does not contact the paracone and the third and fourth lophs are labially fused to the metacone, delimiting a posterior fossette (Fig. 2.17), unlike *Protacaremys* Ameghino, 1902. MPM-PV 20207 (Fig. 2.18) is an isolated lower molar that has four thin lophs and acuminate labial cuspids, as in *Prospaniomys priscus* and unlike *Protacaremys*. Nevertheless, these specimens seem to be a new species since they are smaller than the type species and have slightly higher crowns.

These new findings are remarkable since *Prospaniomys* was previously only recognized in Colhuehuapian sediments (Early Miocene) of the Province of Chubut. MPM-PV 20207 was recorded in ESL (BB); and MPM-PV 20294 and MPM-PV 20560 were found in ECA2 from SBB (Tab. 2; Appendix 1).

#### Family ACAREMYIDAE Wood, 1949

#### Genus *Acaremys* Ameghino, 1887a

**Type species.** *Acaremys murinus* Ameghino, 1887a. Sarmiento Formation, Colhue Huapi Member, Early Miocene, Province of Chubut; Pinturas Formation, upper sequence, late Early Miocene, and Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

#### *Acaremys murinus* Ameghino, 1887a

**Referred materials.** See Appendix 1.

**Locality and Horizon.** See Appendix 1.

#### *Acaremys* sp.

**Referred material.** See Appendix 1.



**Locality and Horizon.** See Appendix 1.

**Comments.** *Acaremys*, *Sciamys* and other octodontoids are grouped within Acaremyidae, the only extinct octodontoid family recognized (Arnal and Vucetich, 2015b). *Acaremys* is lower-crowned than *Sciamys* and higher-crowned than *Galileomys* and *Platypittamys*. Cheek teeth have discernible cusps, relatively thin lophs/ids, and replace the deciduous premolars with age, unlike most fossil octodontoids. Upper and lower molars have four main lophs/ids, unlike *Acarechimys*. *Acaremys* is recognized by three valid species: *A. murinus*, *A. messor* Ameghino, 1889 and *A. major* Scott, 1905 (Early–Middle Miocene, Province of Santa Cruz). For a detailed description of these species see Arnal and Vucetich (2015b).

Within the new rodent sample, *Acaremys* is represented in ESL from BB by *Acaremys* sp. (MPM-PV 20175, MPM-PV 20216; Tab. 2); in SBB by *A. murinus* in ECA (MPM-PV 20272) and ECA2 (MPM-PV 20538), and by *Acaremys* sp. in ECA2 (MPM-PV 20653) (Tab. 2).

Genus *Sciamys* Ameghino, 1887a

**Type species.** *Sciamys principalis* Ameghino, 1887a. Pinturas Formation, upper sequence, late Early Miocene and Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

*Sciamys principalis* Ameghino, 1887a

Figure 2.19–20

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

*Sciamys latidens* Scott, 1905

Figure 2.21–22

**Referred material.** MPM-PV 20668, right mandible with p4–m2.

**Locality and horizon.** Segundas Barrancas Blancas (ECA2), Río Santa Cruz, Province of Santa Cruz. Early–Middle Miocene.

*Sciamys* sp.

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

**Comments.** *Sciamys* is similar to *Acaremys*, but differs in having higher crowns and less discernible cusps. As in *Acaremys*, it has upper and lower molars with four lophs/ids and replaces the deciduous premolar through life. *Sciamys* is more abundant than *Acaremys* (Appendix 1) and it is recognized by at least six species: *S. principalis*, *S. varians* Ameghino, 1887a, *S. robustus* Ameghino, 1894, *S. rostratus* Scott, 1905, *S. latidens* Scott, 1905 (Early–Middle Miocene, Province of Santa Cruz), and *S. petisensis* Arnal and Pérez, 2013 (Middle–Late Miocene, Province of Chubut).

Within the new rodent sample, the genus is present but scarce at EAG (*Sciamys principalis* and *Sciamys* sp.) of BB, but absent in ESL (Tab. 2). On the contrary, it is very abundant in SBB, especially in ECA2 where *S. principalis*, *S. latidens*, and *Sciamys* sp. have been identified (Tab. 2; Appendix 1). The genus is absent in YH. A notably new record for the RSC is the presence of *Sciamys latidens* in ECA2 (MPM-PV 20668; Fig. 2.19–20). This species is well-characterized by having a molarized posterior portion of the p4 (Fig. 2.19), as in *Sciamys petisensis* and unlike all the remaining Early Miocene species, and was previously known only for Killik Aike, coastal Santa Cruz Province, Argentina (Scott, 1905; Fig. 1).

Several specimens could not be recognized at generic level and are listed as Acaremyidae (Appendix 1).

Superfamily ERETHIZONTOIDEA Simpson, 1945

Family ERETHIZONTIDAE Thomas, 1897

Genus *Steiromys* Ameghino, 1887a

**Type species.** *Steiromys detentus* Ameghino, 1887a. Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

*Steiromys detentus* Ameghino, 1887a

Figure 3.23–24

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

*Steiromys duplicatus* Ameghino, 1887a

**Referred material.** see Appendix 1.

**Locality and horizon.** See Appendix 1.

## Octodontoidea



## Erethizontoidea



*Steiromys duplicatus?*

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

*Steiromys* sp.

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

**Comments.** Erethizontids are medium-size caviomorphs. Extant and fossil erethizontids have generally conservative skull and dental morphologies, with low-crowns and bunolophodont to lophodont cheek teeth (Patton *et al.*, 2015). They replace the deciduous premolars, with the exception of the extant *Chaetomys* Gray, 1843 (Patterson and Wood, 1982). In occlusal view the dentine in erethizontids has very thin enamel (Fig. 2.23), unlike octodontoids. Laterally, the molar crowns are bulging (Fig. 2.24). *Steiromys* is slightly higher-crowned than *Eosteiomys* Ameghino, 1902.

Within the new rodent sample, *Steiromys detentus* was found in EAG (MPM-PV 20058) from BB, and ECA (MPM-PV 20384) and ECA2 (MPM-PV 20598; MPM-PV 20652) from SBB (Tab. 2; Appendix 1). Upper molars have four main lophs and relatively well-individualized cusps (MPM-PV 20058). Lower cheek teeth have four lophids that wear the two anterior and the two posterior ones delimiting an anterior and posterior fossettid (Fig. 2.23). Molars are rectangular. The p4 is relatively longer than the molars, the anterior portion is labio-lingually shorter, and can bear four (MPM-PV 20442; Fig. 2.23) or five lophids (MPM-PV 20384). The incisors are robust with a plane anterior face. *Steiromys duplicatus* is less

abundant, but was also recorded in EAG (MPM-PV 20086–20095) from BB, and in ECA2 (MPM-PV 20630) from SBB (Appendix 1). This species differs from *S. detentus* in having five lophs in upper (MPM-PV 20087; MPM-PV 20630) and lower (MPM-PV 20094) molars.

Several broken teeth were recognized as *Steiromys* sp. in BB (MPM-PV 20096, MPM-PV 20097; Tab. 2; Appendix 1).

Superfamily CAVIOIDEA (Fischer de Waldheim, 1817)

Genus *Neoreomys* Ameghino, 1887a

**Type species.** *Neoreomys australis* Ameghino, 1887a. Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

*Neoreomys australis* Ameghino, 1887a

Figure 3.1–3

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

**Comments.** *Neoreomys* is traditionally characterized by having hypsodont and rooted cheek teeth, more high crowned than in *Dasyprocta* Illiger, 1811, *Myoprocta* Thomas, 1903, *Asteromys* Ameghino, 1897, and *Luantus initialis* Ameghino, 1902. Cheek teeth have more penetrating flexus/id with persistent fossettes/ids: the hypoflexus is joined to the paraflexus and the hypoflexid joined to a posteroflexid (Fig. 3.1). The enamel is continuous around the entire crown and cementum is present in the hypoflexus/id.

Ameghino recognized nine species of *Neoreomys* from the Santa Cruz Formation (Ameghino, 1887a; 1891; 1894). Scott (1905) considered only three of those to be valid. Fi-

**Figure 2.** Octodontoidea (1–22) and Erethizontoidea (23–24). 1–4, *Spaniomys* sp.; 1, MPM-PV 20182, right mandibular fragment with m1–m2 in occlusal view; 2, MPM-PV 20178, left mandible with m1–m3 and incisor in occlusal view (inverted); 3–4, MPM-PV 20310, left maxillary fragment with M1–M2 (inverted) in occlusal (3) and lingual (4) views; 5–6, *Stichomys regularis*; 5, MPM-PV 20237, left mandibular fragment with m1–m2; 6, MPM-PV 20276, left mandibular fragment with m1–m2; 7–8, *Stichomys* sp., MPM-PV 20415, left mandible with m1–m3 in occlusal (7) and labial (8) views; 9–10, *Stichomys regularis*, MPM-PV 20444, left mandible (inverted) in occlusal and ventral views; 11–13, *Acarechimys minutus*; 11, MPM-PV 15088, left maxilla with DP4–M3 in occlusal view (inverted); 12–13, MPM-PV 15089, right mandible in labial (12) and lingual (13) views; 14–15, *Acarechimys gracilis*, MPM-PV 17430, left mandible with dp4–m3 (inverted) in occlusal (14) and labial (15) views; 16, *Dudumus* sp. nov.? MPM-PV 20561, right DP4–M1; 17–18, *Prospaniomys* sp. nov.?; 17, MPM-PV 20294, right DP4–M1; 18, MPM-PV 20207, left lower molar; 19–20, *Sciamys principalis*, MPM-PV 20308, right mandible with p4–m3; 21–22, *Sciamys latidens*, MPM-PV 20668, right mandible with p4–m2; 23–24, *Steiromys detentus* MPM-PV 20442, right mandible in occlusal (23) and lingual (24) views. Anterior to right. Scale bars= 5 mm (1–15, 19–22), 1 mm (16–18), and 10 mm (23–24).



nally, Fields (1957) and later authors (*e.g.*, Kramarz and Belloso, 2005; Kramarz, 2006b; Pérez, 2010b; Vucetich *et al.*, 2015) recognized *Neoreomys australis* as the sole species present in the Santa Cruz Formation. Other two species of *Neoreomys* have been described elsewhere in South America: *Neoreomys huiliensis* Fields, 1957 from Villavieja Formation (La Venta, Colombia) and *N. pinturensis* Kramarz, 2006b from the Pinturas Formation (Province of Santa Cruz, Argentina). *Neoreomys australis* is the largest and most abundant caviomorph (more than 120 specimens; see Appendix 1). An exhaustive revision of this genus (currently under study by MEP) is necessary to corroborate the taxonomic status of the species of *Neoreomys*, and its specific richness in the Santa Cruz Formation. Within the new rodent sample, *Neoreomys* is the only cavioid present in YH, the oldest locality (Tab. 2). Moreover, this genus is well-represented in the other localities of the SCR: EAG and ESL from BB, and ECA, ECA2, and EET from SBB (Tab. 2; Appendix 1).

#### Genus *Phanomys* Ameghino, 1887a

**Type species.** *Phanomys mixtus* Ameghino, 1887a. Río Jeinemení Formation, Pinturas Formation and Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

#### *Phanomys mixtus* Ameghino, 1887a

Figure 3.4–5

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

#### *Phanomys* sp.

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

**Comments.** *Phanomys* is known by two species *P. mixtus* and *P. vetulus* Ameghino, 1894. *Phanomys mixtus* is represented by fragmentary maxillae, mandibles, and isolated teeth (Appendix 1). *Phanomys* is characterized by having high-crowned and rooted cheek teeth (with a greater degree of hypsodonty compared with other basal cavioids such as species of *Luantus* Ameghino, 1902), the presence of cementum in earlier stages of wear, relatively ephemeral fossettes/ids, and enamel discontinuities along the entire

labial wall of upper cheek teeth and the lingual wall of lower cheek teeth (Fig. 3.4–5; for a detail description of the genus see Pérez and Vucetich, 2012).

Interestingly, in RSC *Phanomys* is much more abundant in EAG from BB, but its richness decreases while that of the euhypsodont cavioids (*i.e.*, *Schistomys*) increases in ECA and ECA2 (SBB) (Tab. 2; Appendix 1).

Recent phylogenetic study suggests that *Phanomys* is the sister group of the euhypsodont cavioids. Additionally, *P. mixtus* was proposed as a useful biostratigraphic indicator because it was found in different Miocene localities of the Province of Santa Cruz (Pérez and Vucetich, 2012).

#### Genus *Eocardia* Ameghino, 1887b

**Type species.** *Eocardia montana* Ameghino, 1887b. Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

#### *Eocardia montana* Ameghino, 1887b

Figure 3.6–9

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

#### "*Eocardia*" *excavata* Ameghino, 1891b

Figure 3.10

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

#### *Eocardia* sp.

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

**Comments.** *Eocardia* was originally defined by Ameghino (1887b) and traditionally several species were included in this genus or subgenus (*e.g.*, Ameghino, 1887a, 1891b, 1894, 1906; Scott, 1905). Pérez (2010b) reduced the nominal diversity of Santacrucian forms to three species: the type species *Eocardia montana*, "*E.*" *excavata* and the smaller "*E.*" *fissa* Ameghino, 1891a. *Eocardia* is characterized by having continuous growth of the cheek teeth without root formation, double and heart-shaped cheek teeth, ephemeral fossettes/ids, presence of cementum beginning at very

early ontogenetic stages, and a narrow and discontinuous enamel layer surrounding the crown (Fig. 3.6–10). *Eocardia* is the only euhypsodont cavioid whose upper premolar has only one lobe (Fig. 3.6). The new RSC remains are assigned to *E. montana*, "*E. excavata*", and *Eocardia* sp. (Tab. 2). It is interesting to note that although "*E. fissa*" has not been recorded in the new collections, this species was mentioned as coming from the RSC by Ameghino (1891; Pérez, 2010).

*Eocardia* is present at EAG and ESL from BB, and ECA, ECA2, and EET from SBB.

#### Genus *Schistomys* Ameghino, 1887a

**Type species.** *Schistomys erro* Ameghino, 1887a. Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

#### *Schistomys erro* Ameghino, 1887a

Figure 3.11

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

**Comments.** *Schistomys* was established by Ameghino (1887a); later, additional species were assigned to this genus (Ameghino, 1891; Scott, 1905). Currently, only two species are considered valid (Pérez, 2010): the type species *Schistomys erro* and *S. rollinsii* (Scott, 1905). *Schistomys* is characterized by the same morphological characters as *Eocardia*, however they differ in that the upper premolar (P4) has two well-developed lobes similar to those of molars (Fig. 3.11). The only species recorded at SCR is *S. erro* which is present at ECA2 and EET from SBB (Tab. 2; Appendix 1).

It should be noted that in ECA2 (SBB), where the abundance of *Phanomys* is lower, *Schistomys* appears for the first time at SCR (Tab. 2). Whereas in EET, where *Schistomys* abundance is greater, *Phanomys* is not recorded.

#### Superfamily CHINCHILLOIDEA Bennett, 1833

#### Family CHINCHILLIDAE Bennett, 1833

#### Genus *Prolagostomus* Ameghino, 1887a

**Type species.** *Prolagostomus pusillus* Ameghino, 1887a. Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

#### *Prolagostomus pusillus* Ameghino, 1887a

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

#### *Prolagostomus* sp.

Figure 3.12

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

**Comments.** *Prolagostomus* is a small to medium sized caviomorph, similar to *Pliolagostomus* Ameghino, 1887a. The upper and lower cheek teeth are euhypsodont and bilophodont, with the exception of the M3, which has three lophs. The hypoflexus/id are narrower than in *Perimys* Ameghino, 1887a, but broader than in *Lagostomus* Brookes, 1828. Molar crown walls are more curved and hypoflexid is more sinuous (Fig. 3.12) than in *Pliolagostomus*. The anterior lophid of lower molars is more labially extended (Fig. 3.12), unlike *Perimys*. The p4 is more obliquely oriented than molars (Fig. 3.12), unlike *Pliolagostomus*.

*Prolagostomus* is in general more abundant than *Pliolagostomus* (Appendix 1). Within the new rodent sample this genus is relatively well-represented in ECA, ECA2, and EET from SBB (Tab. 2; Appendix 1). It is only represented by two broken molars of *Prolagostomus* sp. (MPM-PV 20231, MPM-PV 20232; Tab. 2) in ESL from BB and is absent in YH.

#### Genus *Pliolagostomus* Ameghino, 1887a

**Type species.** *Pliolagostomus notatus* Ameghino, 1887a. Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

#### *Pliolagostomus notatus* Ameghino, 1887a

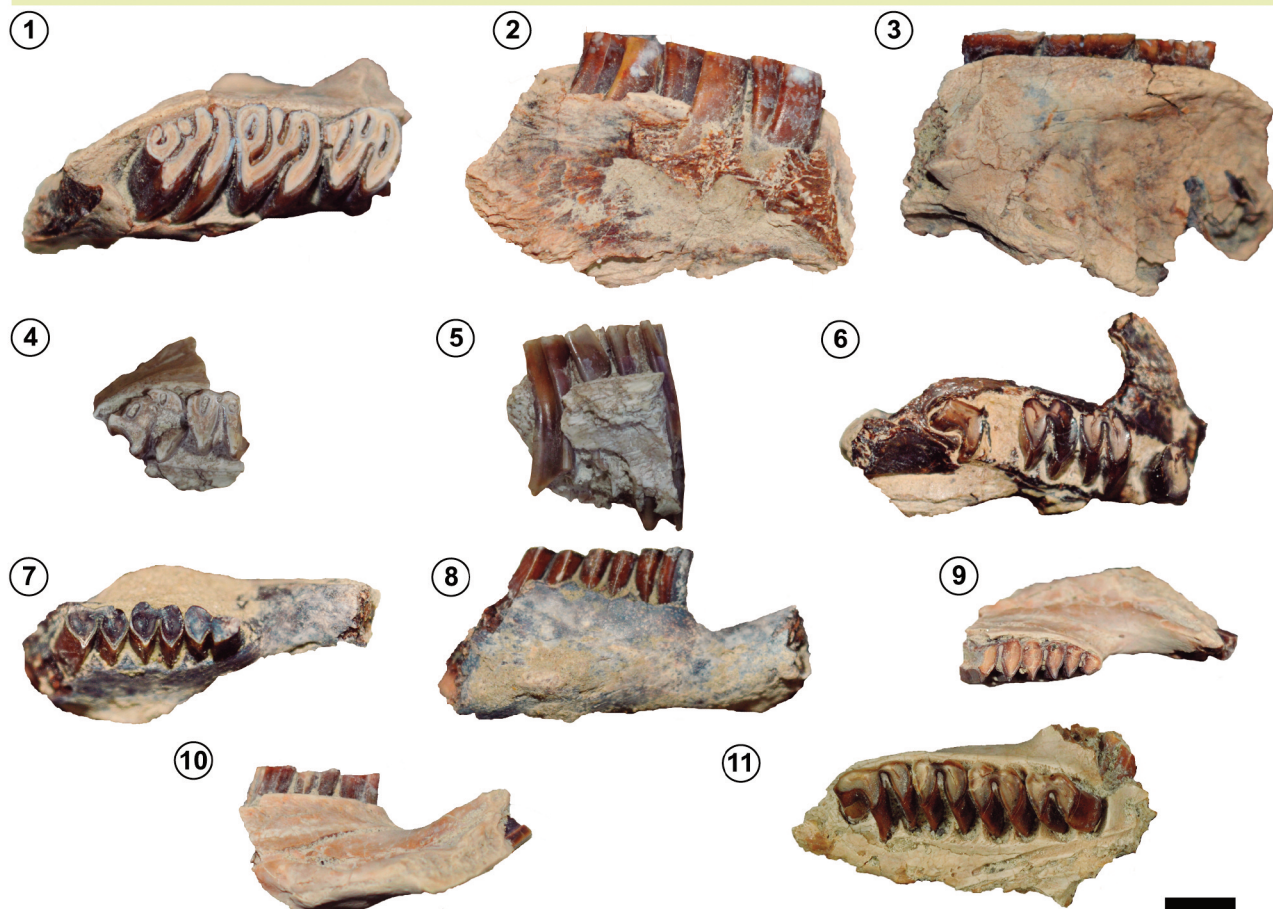
**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

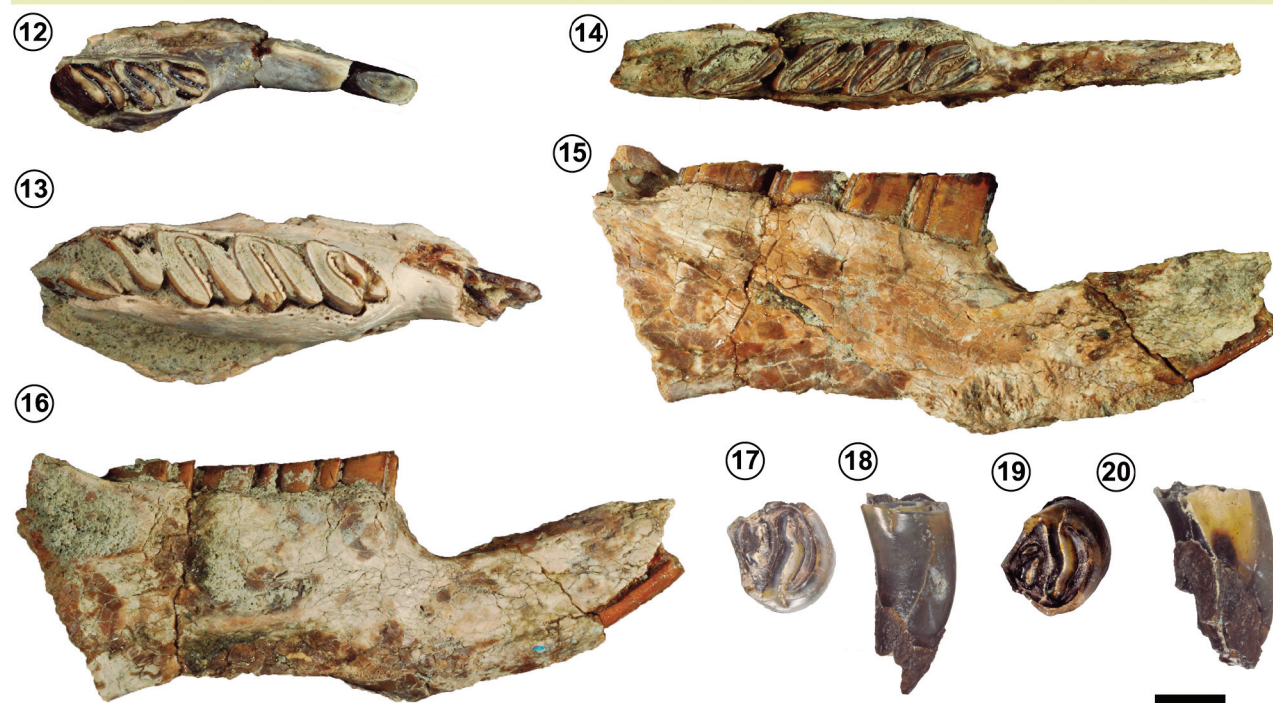
**Comments.** *Pliolagostomus* is a small to medium sized caviomorph, similar to *Prolagostomus*. Upper and lower cheek teeth are euhypsodont and bilophodont, with the exception of the M3 which has three lophs. Cheek-tooth crown walls are straighter than *Prolagostomus*. Hypoflexus/



## Cavioidea



## Chinchilloidea



id is narrow, as in *Prolagostomus*. For a detailed description of this species see Rasia and Candela (2019).

As in *Prolagostomus*, this species is relatively well-represented in the three sites of SBB (ECA, ECA2, and EET; Tab. 2; Appendix 1). Notably, it is absent in BB and YH. Several specimens could not be identified at generic level and were assigned to *Prolagostomus* sp./*Pliolagostomus* sp. (MPM-PV 20259, MPM-PV 20349, MPM-PV 20381; Appendix 1).

Family NEOPIBLEMIDAE Kraglievich, 1926

Genus *Perimys* Ameghino, 1887a

**Type species.** *Perimys erutus* Ameghino, 1887a. Pinturas Formation, Early Miocene, and Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

*Perimys erutus* Ameghino, 1887a

Figure 3.13

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

*Perimys onustus* Ameghino, 1887a

Figure 3.14–16

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

*Perimys incavatus* Ameghino, 1902

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

*Perimys* sp.

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

**Comments.** *Perimys* is a medium to large sized caviomorph. Cheek teeth are protohypsodont, unlike *Prolagostomus* and *Pliolagostomus*. Upper and lower cheek teeth are bilophodont, with the exception of the M3 which has three lophs, as in *Prolagostomus* and *Pliolagostomus*. Nevertheless, *Perimys* differs in that this third loph is parallel to the anterior two lophs, and in that the hypoflexus/id are conspicuously broader and filled with more cementum. Thus, these teeth have a U-shape occlusal surface (Fig. 3.13–16).

The genus was abundantly recovered in both in BB and SBB, but notably, the largest species, *P. onustus*, is very abundant in SBB, while in BB it is represented by a single specimen (MPM-PV 20160), and the small species, *P. incavatus*, is more abundant in BB (Tab. 2; Appendix 1).

Family DINOMYIDAE Alston, 1876

Genus *Scleromys* Ameghino, 1887a

*Scleromys angustus.* Ameghino, 1887a. Santa Cruz Formation, Early–Middle Miocene, Province of Santa Cruz.

*Scleromys* sp.

Figure 3.17–20

**Referred materials.** See Appendix 1.

**Locality and horizon.** See Appendix 1.

**Comments.** Among the species of *Scleromys* recognized in

**Figure 3.** Caviioidea (1–11) and Chinchilloidea (12–17). 1–3, *Neoreomys australis* MPM-PV 20292, right maxillary fragment with M1–M3 in occlusal, lingual, and labial views; 4–5, *Phanomys mixtus* MPM-PV 20048, right maxilla with M2–M3 in occlusal and lingual views; 6, *Schistomys erro* MPM-PV 20529, right maxilla with P4–M3 in occlusal view; 7, “*Eocardia*” *excavata* MPM-PV 20241, right maxilla with P4–M3 in occlusal view; 8–9, *Eocardia montana* MPM-PV 20401, left mandible with p4–m2 in occlusal and labial views (inverted); 10–11, *Eocardia montana* MPM-PV 20053, right mandible with p4–m2 in occlusal and lingual views; 12, *Prolagostomus* sp. MPM-PV 20314, right mandible with p4–m2 in occlusal view; 13, *Perimys erutus* MPM-PV 20671, right mandible with p4–m3 in occlusal view; 14–16, *Perimys onustus* MPM-PV 20670, left mandible with p4–m3 in occlusal, lingual and labial views (inverted); 17–18, *Scleromys* sp. MPM-PV 20098, left upper molar; 19–20, *Scleromys* sp. MPM-PV 20099, left upper molar. Anterior to the right. Scale bars= 5 mm (1–13), 7.5 mm (14–16), and 3 mm (17–20).

the Santa Cruz Formation, *S. osbornianus* Ameghino, 1894 is the largest and the most abundant, whereas the type species, *S. angustus*, is less common. *Scleromys* is characterized by high-crowned molariforms with root formation and an occlusal pattern that consists in a long posterior labial flexid and an anterior lingual flexus. During the ontogeny, this genus displays a great amount of dental morphological change due to flexi/ids closure, fossette/ids disappearance, and changes in molar size and outline. For this reason, isolated teeth are difficult to assign to a species.

In the RSC the genus is not abundant, but *Scleromys* sp. was recorded both in BB and SBB (Tab. 2; Appendix 1).

## DISCUSSION

### *Caviomorph assemblages of the Río Santa Cruz localities*

In this contribution, a revision of the rodent fauna recorded in the localities of the RSC is presented (Tab. 1). The three fossil localities (BB, SBB, and YH; Appendix 1) represent different age ranges, and only the upper part of BB overlaps with the lowest part of SBB (Cuitiño *et al.* 2016, 2019). Not all the Santacrucian caviomorphs were found in all these localities (see above). SBB is the most fossiliferous locality with 557 specimens (72.5% of the fossil caviomorphs; ECA n= 179, ECA2 n= 272, and EET n= 106). In BB we found 208 specimens (27%; EAG n= 124, ESL n= 84) and in YH only three caviomorphs (0.4%) were recorded, making it the least fossiliferous locality (Appendix 1).

**Octodontoidea.** Octodontoids are the richest taxonomically and morphologically diverse group in the RSC with nine genera and 16 species (Appendix 1). This group is represented by low-crowned taxa. Some have low crowns with slightly terraced cheek teeth (*e.g.*, *Dudumus* sp. nov.? and *Acarechimys*). Others have slightly higher crowns (*e.g.*, *Prospaniomys* sp. nov.?, *Acaremys*). Still others have much higher crowns and planar occlusal surfaces (*e.g.*, *Sciamys*, *Stichomys*, *Spaniomys*). The most abundant taxa are *Spaniomys*, *Stichomys*, *Sciamys*, and *Acarechimys*, all of them broadly represented in all the localities of the RSC (see results above; Appendix 1). Within acaremyids we note the first record at RSC of *Sciamys latidens* from (ECA2, SBB; Appendix 1). It differs from the remaining Santacrucian *Sciamys* species in having a p4 with a molarized posterior portion (presence of hypolophid; Fig. 2.21). This species was previ-

ously known only by its holotype recorded at Killik Aike, near Río Gallegos, Province of Santa Cruz (Scott, 1905; Fig. 1). We also identify two new brachydont taxa (*Prospaniomys* sp. nov.? and *Dudumus* sp. nov.?). *Prospaniomys* sp. nov.? was recorded in ESL from BB and in ECA2 from SBB (Tab. 2; Appendix 1). In turn, *Dudumus* sp. nov.? was recorded in ECA2 (SBB). These records extend the biochron of both genera from the Colhuehuapian to the Santacrucian, as well as their geographic distributions (provinces of Chubut and Santa Cruz). Additionally, other brachydont specimens found in ESL (BB) could represent new taxa (*e.g.*, MPM-PV 20184, MPM-PV 20205; Appendix 1). These specimens are important because low-crowned octodontoids dominated older caviomorph assemblages of Patagonia (Vucetich *et al.*, 2010; Kramarz, 2004) and, until now, they were scarce in the Santa Cruz Formation –represented only by *Acarechimys*; Arnal *et al.* (2017)–. Thus, these new records expand the number of brachydont octodontoids for the Santacrucian.

**Erethizontidae.** Erethizontids have the least specific richness and abundance in the RSC. Within the new sample only 22 specimens are identified as *Steiromys detentus* (Fig. 3.23), *S. duplicatus*, and *Steiromys* sp. They have been found in BB (in EAG) and in SBB (in ECA, ECA2, and EET) (Appendix 1). This low abundance is in accordance with previous works (Ameghino, 1887a, 1889; Scott, 1905; Candela, 2000), in which *Steiromys* is the only recognized Santacrucian genus. Scott (1905) described *Steiromys intermedius*, another species from Guer Aike Department, Province of Santa Cruz (Fig. 1), that is not recorded in the RSC localities. As with octodontoids, the abundance of erethizontoids in the Santacrucian late Early–Middle Miocene greatly contrasts with that of the Colhuehuapian Early Miocene, where they are represented by four genera and several species (Vucetich *et al.*, 2015). Neither erethizontids nor octodontoids show any biostratigraphic zonation within the RSC localities.

**Cavioidea.** Unlike the above mentioned caviomorph clades, cavioids and chinchilloids have interestingly different distribution and taxonomic abundance in the different RSC localities. Within cavioids the derived euhipyodont *Schistomys* is present in SBB (ECA2 and EET) but absent in BB and YH. *Phanomys* and *Eocardia* are present in BB and in SBB



(Tab. 2; Appendix 1), but they differ in their generic distribution. On the one hand, the primitive protohypsodont *Phanomys* is more abundant in BB, in which it is represented by 17 specimens –EAG (n= 16) and ESL (n= 1)–, while in SBB only by 5 specimens –ECA (n= 1) and ECA2 (n= 4)–. On the other hand, the derived euhypsodont *Eocardia* is much more abundant in SBB (n= 65) than in BB (n= 36; Appendix 1). Although biostratigraphic information generally is based on presence/absence of taxa in each locality, we interpret that the differences in abundance of *Phanomys* and *Schistomys* observed in BB and SBB are related to a taxonomic replacement of both taxa. The euhypsodont *Eocardia* was present in both localities, but became much more abundant in SBB.

*Neoreomys australis* is the most abundant cavioid represented by 131 specimens found in the three localities of the RSC (BB, SBB, and YH; Appendix 1). Thus, this cavioid provides no biostratigraphic information.

**Chinchilloidea.** Within chinchilloids *Perimys* is present in BB (n= 21) and in SBB (n= 35). Nevertheless, between both localities the species distribution is different. In SBB the largest species, *Perimys onustus*, is clearly dominant with respect to the small and medium sized species of *Perimys* (*P. erutus*, *P. incavatus*, and *Perimys* sp.; Appendix 1), while in BB *P. onustus* is represented by a single specimen. In this regard, we note the first RSC record of the small species *Perimys incavatus* in BB (EAG). *P. incavatus* was previously recorded in the Colhuehuapian (Early Miocene) of the Province of Chubut (Vucetich *et al.*, 2010) and in the Santacrucian (Early–Middle Miocene) of southern Chile (Bostelmann *et al.*, 2013). A different generic and specific distribution is observed for the derived euhypsodont *Prolagostomus* and *Pliolagostomus*. They are the most abundant chinchilloids in SBB (n= 176), while they are represented by only two specimens of *Prolagostomus* sp. in BB (Appendix 1). *Scleromys* is represented in BB and SBB by 12 specimens assigned to *Scleromys* sp. (Appendix 1).

Caviomorphs of other Santacrucian localities are poorly known. Ameghino (1891a,b, 1894) described new species of those Santacrucian genera described in 1887a,b and 1889. But unfortunately, precise geographic and stratigraphic information is uncertain (Fernicola *et al.*, 2014). Scott (1905) studied several caviomorphs from the Santa Cruz Formation recovered from the cliffs of RSC and coastal

localities of the east of the Province of Santa Cruz (Killik Aike, 10 miles south of Coy inlet; Marshall, 1976; Vizcaíno *et al.*, 2012b; Fig. 1). Except for a few species, all of them belong to the genera recovered previously in the RSC cliffs (*i.e.*, *Neoreomys*, *Phanomys*, *Schistomys*, *Eocardia*, *Stichomys*, *Spaniomys*, *Steiromys*, *Sciamys*, *Acaremys*, *Acarechimys*, and *Scleromys*).

In summary, we observed a reduction in the taxonomic diversity but an increased in the morphological disparity of the rodent assemblage from the RSC (Tab. 1 and discussion above) than previously known (Ameghino, 1887a,b, 1889, 1891; Scott, 1905; Tab. 1). This work is the first comprehensive attempt in revising the Santacrucian caviomorphs. Similar systematic revisions should be approached with the caviomorph materials collected in other Santacrucian localities, in order to better understand the Santacrucian caviomorph assemblage as a whole.

## GENERAL EVOLUTIONARY ASPECTS

Santacrucian rodents show significant changes compared with those of older Colhuehuapian and “Pinturan” SALMAs (Kramarz, 2004, 2006a,b; Kramarz and Belloso, 2005; Vucetich *et al.* 2010; Pérez and Pol, 2012; Arnal and Vucetich, 2015a). Several lineages experienced a progressive increase in hypsodonty (*e.g.*, octodontoids with *Sciamys*, *Stichomys*, *Spaniomys*) or even acquired euhypsodonty for the first time (*e.g.*, cavioids, chinchillids). Those rodents with more generalized dental patterns (*e.g.*, *Steiromys*) became less common. Within Caviioidea, the acquisition of hypsodonty is first seen during the Santacrucian SALMA (Pérez and Pol, 2012), but the increase in dental crown height is already recorded in previous ages (*e.g.*, *Luantus* in the Colhuehuapian and “Pinturan”; *Chubutomys* Wood and Patterson, 1959 in the Deseadan SALMA), unlike what is observed in octodontoids, which show increased crown height for the first time in the Santacrucian. In the RSC localities, meso-, proto-, and euhypsodont taxa coexisted for some time during the Santacrucian (see previous section). Until now mesodont forms that would eventually give origin to the modern Dasyproctidae on the one hand and euhypsodont forms that would originate the Family Caviidae on the other hand, were recorded only in younger ages (*e.g.*, “Colloncuran”, Laventan, Mayoan, early Late Miocene). Interestingly, a similar trend

occurs within Chinchilloidea. During the Santacrucian, *Perimys* is the most abundant chinchilloid in BB and had the greatest specific richness. In SBB this taxonomic richness decreased (represented mostly by *P. onustus*); the record from SBB marks the last appearance of the genus. This taxonomic decrease is observed together with the rise in the abundance of specimens of the derived lagostomines *Pliolagostomus* and *Prolagostomus*. Noteworthy, one *Perimys* species in SBB coexisted, which is larger than the abovementioned lagostomines. This may be related to the biology of these taxa, probably *P. onustus* not competing for ecological requirements with the other chinchilloids.

Within octodontoids, the record of *Dudumus* sp. nov.? and *Prospaniomys* sp. nov.? expand the biochron and geographic distribution of these genera. Both taxa and *Acarechimys* are the only brachydont octodontoids in the RSC and are also recorded in older Colhuehuapian beds. Nevertheless, they differ in that *Dudumus* and *Prospaniomys* were abundant in older beds and are represented by only four specimens in the RSC, while *Acarechimys* is much more abundant in the Santacrucian. In addition, *Acarechimys* and *Sciamys* are the only octodontoids recorded in younger Middle Miocene beds (Arnal and Pérez, 2013; Arnal *et al.*, 2017). These younger *Acarechimys* maintained the brachydont cheek tooth structure, and are not recorded in Patagonia but in middle latitudes of the continent (Quebrada Honda, Bolivia; see Arnal *et al.*, 2017). This geographic distribution was proposed to be the result of a migration event (from Patagonia to lower latitudes regions) induced by the marked aridization and cooling of higher latitudes of South America after the Early Miocene (Arnal *et al.*, 2017). On the other hand, the last record of *Sciamys* is that of *Sciamys petisensis*, found in the locality of El Petiso, Province of Chubut (Arnal and Pérez, 2013). The fossil-bearing bed of El Petiso is estimated to be of Middle–Late Miocene Age. *Sciamys petisensis* is higher-crowned than its Santacrucian relatives. In fact, it is the highest-crowned and last recorded acaremyid (Arnal and Pérez, 2013). This survival would be the result not of a migration like *Acarechimys*, but of increasing hypsodonty in order to counteract the aridization of these latitudes. Erethizontids became scarce in Patagonia by the Santacrucian, being since then recorded only in lower lati-

tudes (e.g., Bolivia, Colombia).

In addition to this turnover in teeth morphology, Santacrucian rodents have different sizes: they were large (*Neoreomys*, *Perimys onustus*), medium-sized (*Scleromys*, *Steiromys*, *Eocardia*, and the remaining *Perimys* species) and small (octodontoids). This diversity reflects a wide range of habits, suggesting they had acquired broad paleobiologic adaptations by the Early–Middle Miocene (Candela *et al.*, 2012; Muñoz *et al.*, 2019). This, in turn, is related to the environment in which they lived. Recent works proposed more humid and forested paleoenvironments for the Santa Cruz Formation (Kay *et al.*, 2008, 2012; Brea *et al.*, 2012; Rasia, 2016) than historically proposed (Pascual *et al.*, 1996; Vucetich *et al.*, 2015). Evidently, these varied landscape scenarios (that resulted from considerable climatic changes) permitted the evolution and diversification of the Santacrucian caviomorphs. Paleobiological aspects deserve further detailed analyses which are beyond the scope of this systematic study.

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APPENDIX 1 - List of fossil caviomorph specimens from the Río Santa Cruz. In different shades of green: Barrancas Blancas (BB), Estancia Aguada Grande (EAG), and Estancia Santa Lucía (ESL); in different shades of blue: Segundas Barrancas Blancas (SBB), Estancia Cordón Alto (ECA), Estancia Cordón Alto2 (ECA2), and Estancia El Tordillo (EET); Orange: Yaten Huageno (YH) and Estancia El Refugio (EER)

Locality	Estancia	Collection number	Systematic taxonomy	Material
BB	Estancia Aguada Grande (EAG)	MPM-PV 20773	<i>Sciamys principalis</i>	left mandible with p4-m3
		MPM-PV 20036	<i>Phanomys mixtus</i>	right P4
		MPM-PV 20037	<i>Phanomys mixtus</i>	right M1 or M2
		MPM-PV 20038	<i>Neoreomys australis</i>	right M1 or M2
		MPM-PV 20039	<i>Perimys sp.</i>	isolated upper tooth
		MPM-PV 20040	<i>Spaniomys sp.</i>	right upper molar
		MPM-PV 20041	<i>Spaniomys sp.</i>	right upper molar
		MPM-PV 20042	<i>Spaniomys sp.</i>	right upper molar
		MPM-PV 20043	<i>Acaremyidae</i>	left lower molar
		MPM-PV 20044	<i>Sciamys?</i>	left p4
		MPM-PV 20045	<i>Neoreomys australis</i>	right maxilla with DP4-M3
		MPM-PV 20046	<i>Neoreomys australis</i>	left M1 or M2
		MPM-PV 20047	<i>Neoreomys australis</i>	right p4
		MPM-PV 20048	<i>Phanomys mixtus</i>	right M2-M3
		MPM-PV 20049	<i>Perimys erutus</i>	left M1 or M2
		MPM-PV 20050	"Eocardia" excavata?	left upper molar
		MPM-PV 20051	"Eocardia" excavata?	left m1
		MPM-PV 20052	"Eocardia" excavata?	right m3
		MPM-PV 20053	<i>Eocardia montana</i>	right mandibular fragment with p4-m2
		MPM-PV 20054	<i>Eocardia sp.</i>	left m3
		MPM-PV 20055	<i>Perimys/ Prolagostomus</i>	right m3
		MPM-PV 20056	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20057	<i>Octodontoidea</i>	edentulous left zygomatic fragment
		MPM-PV 20058	<i>Steiromys detentus</i>	right upper molar
		MPM-PV 20059	<i>Acaremyidae</i>	broken P4
		MPM-PV 20060	<i>Spaniomys</i>	right lower tooth broken
		MPM-PV 20061	<i>Neoreomys australis</i>	right M1-M2
		MPM-PV 20062	<i>Neoreomys australis</i>	left m1 or m2
		MPM-PV 20063	<i>Neoreomys australis</i>	left M1 or M2
		MPM-PV 20064	<i>Eocardia montana</i>	left p4
		MPM-PV 20065	<i>Eocardia montana</i>	right m1
		MPM-PV 20066	<i>Eocardia montana</i>	right m2
		MPM-PV 20067	"Eocardia" excavata	left mandible with m1-m2
		MPM-PV 20068	<i>Spaniomys sp.</i>	right mandible with m1-m2
		MPM-PV 20069	<i>Acarechimys minutissimus</i>	right mandible with m1-m2
		MPM-PV 20070	<i>Octodontoidea</i>	lower incisor
		MPM-PV 20071	<i>Caviomorpha</i>	lower incisor
		MPM-PV 20072	<i>Phanomys mixtus</i>	left M3
		MPM-PV 20073	<i>Phanomys mixtus</i>	right M3
		MPM-PV 20074	<i>Phanomys mixtus</i>	right M1
		MPM-PV 20075	<i>Phanomys mixtus</i>	left M1
		MPM-PV 20076	<i>Phanomys mixtus</i>	right M2
		MPM-PV 20077	<i>Phanomys mixtus</i>	left M2
		MPM-PV 20078	<i>Phanomys mixtus</i>	right m1 or m2
		MPM-PV 20079	<i>Phanomys mixtus</i>	left m1
		MPM-PV 20080	<i>Phanomys mixtus</i>	left m1 or m2

## APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20081	<i>Spaniomys</i> sp.	upper cheek teeth
		MPM-PV 20082	<i>Neoreomys australis</i>	right M1 or M2
		MPM-PV 20083	<i>Scleromys</i> sp.	left M1 or M2
		MPM-PV 20084	<i>Scleromys</i> sp.	left M1 or M2
		MPM-PV 20085	<i>Scleromys</i> sp.	P4?
		MPM-PV 20086	<i>Steiromys duplicatus</i>	left DP4
		MPM-PV 20087	<i>Steiromys duplicatus</i>	right M1 or M2
		MPM-PV 20088	<i>Steiromys duplicatus</i>	right M1 or M2 (broken)
		MPM-PV 20089	<i>Steiromys duplicatus</i>	right M1 or M2 (broken)
		MPM-PV 20090	<i>Steiromys duplicatus</i>	left M1 or M2
		MPM-PV 20091	<i>Steiromys duplicatus</i>	left M1 or M2
		MPM-PV 20092	<i>Steiromys duplicatus</i>	left M3
		MPM-PV 20093	<i>Steiromys duplicatus</i>	left dp4
		MPM-PV 20094	<i>Steiromys duplicatus</i>	left mandibular fragment with m2
		MPM-PV 20095	<i>Steiromys duplicatus</i>	left lower incisor
		MPM-PV 20096	<i>Steiromys</i> sp.	2 incisor fragments
		MPM-PV 20097	<i>Steiromys</i> sp.	2 broken teeth
		MPM-PV 20098	<i>Scleromys</i> sp.	left upper molar
		MPM-PV 20099	<i>Scleromys</i> sp.	left upper molar
		MPM-PV 20100	<i>Rodentia?</i>	1 phalanx
		MPM-PV 20101	<i>Rodentia?</i>	distal left humerus
		MPM-PV 20102	<i>Rodentia?</i>	right astragalus
		MPM-PV 20103	<i>Stichomys</i> sp.	left maxillary fragment with DP4-M1
		MPM-PV 20104	<i>Stichomys</i> sp.	right m1 or m2
		MPM-PV 20105	<i>Octodontoidea</i>	left lower molar broken
		MPM-PV 20106	<i>Stichomys</i> sp.	right m3
		MPM-PV 20107	<i>Steiromys duplicatus?</i>	right DP4?
		MPM-PV 20108	<i>Perimys erutus</i>	right M3
		MPM-PV 20109	<i>Eocardia montana</i>	right m1 or m2
		MPM-PV 20110	<i>Eocardia montana</i>	right m1 or m2
		MPM-PV 20111	<i>Caviomorpha</i>	2 incisors
		MPM-PV 20112	cf. <i>Scleromys</i>	right P4
		MPM-PV 20113	<i>Neoreomys?</i>	mandibular fragment with incisor
		MPM-PV 20114	<i>Eocardia</i> sp.	right m1 or m2
		MPM-PV 20115	<i>Spaniomys riparius</i>	left mandibular fragment with dp4-m2
		MPM-PV 20116	<i>Perimys erutus</i>	left M1 or M2
		MPM-PV 20117	<i>Sciamys</i> sp.	left M1 or M2
		MPM-PV 20118	<i>Phanomys</i> sp.	left M1
		MPM-PV 20119	<i>Phanomys</i> sp.	left p4
		MPM-PV 20773	<i>Eocardia</i> sp.	broken tooth
		MPM-PV 20774	<i>Caviomorpha</i>	brachydont molar
		MPM-PV 20775	<i>Caviomorpha</i>	brachydont molar
		MPM-PV 20776	<i>Eocardia</i> sp.	left lower molar
		MPM-PV 20777	<i>Eocardia</i> sp.	left m2 or m3
		MPM-PV 20778	<i>Eocardia</i> sp.	left m3
		MPM-PV 20779	<i>Eocardia</i> sp.	right mandibular fragment with molar
		MPM-PV 20120	<i>Neoreomys australis</i>	right lower molar



APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20121	<i>Neoreomys australis</i>	left M1 or M2
		MPM-PV 20122	<i>Eocardia</i> sp.	left upper molar
		MPM-PV 20123	<i>Octodontoidea</i>	left lower incisor
		MPM-PV 20124	<i>Neoreomys australis</i>	left lower molar
		MPM-PV 20125	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20126	<i>Neoreomys</i> ?	lower incisor fragment
		MPM-PV 20127	<i>Octodontoidea</i>	incisor fragment
		MPM-PV 20128	<i>Neoreomys australis</i>	left p4
		MPM-PV 20129	<i>Neoreomys australis</i>	left m1 or m2
		MPM-PV 20130	<i>Neoreomys australis</i>	left m3 (broken)
		MPM-PV 20131	<i>Neoreomys australis</i>	lower tooth?
		MPM-PV 20132	<i>Neoreomys australis</i>	right P4
		MPM-PV 20133	<i>Neoreomys australis</i>	right M1 or M2
		MPM-PV 20134	<i>Sciamys principalis</i>	left lower molar
		MPM-PV 20135	<i>Stichomys</i> sp.	left DP4
		MPM-PV 20136	<i>Stichomys</i> sp.	right M1 or M2
		MPM-PV 20137	<i>Stichomys</i> sp.	left lower molar
		MPM-PV 20138	<i>Perimys incavatus</i>	right upper molar
		MPM-PV 20139	" <i>Eocardia</i> " excavata	left m1
		MPM-PV 20140	<i>Eocardia</i> sp.	right lower molar (broken)
		MPM-PV 20141	<i>Phanomys</i> / <i>Eocardia</i>	left M1 or M3
		MPM-PV 20142	<i>Caviomorpha</i> ?	long bone
		MPM-PV 20143	<i>Spaniomys</i> sp.	right mandible with m1-m2
		MPM-PV 20144	<i>Phanomys mixtus</i>	left M1 or M2
		MPM-PV 20145	<i>Neoreomys australis</i>	left mandible with p4-m1
		MPM-PV 20146	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20147	<i>Neoreomys australis</i>	left lower molar
		MPM-PV 20148	<i>Neoreomys australis</i>	left m1(broken)-m2 and left molar
		MPM-PV 20149	<i>Spaniomys</i> sp.	left mandible with m1(broken)-m2
		MPM-PV 20150	<i>Neoreomys australis</i>	right upper molar (broken)
		MPM-PV 20151	<i>Perimys</i> sp.	right P4
		MPM-PV 20152	<i>Eocardia</i> sp.	right lower molar
	Estancia Santa Lucia (ESL)	MPM-PV 20153	<i>Neoreomys australis</i>	mandibular symphysis with right m1, m2, and p4; and left, 1, m2, and p4
		MPM-PV 20154	<i>Neoreomys australis</i>	3 incisor fragments
		MPM-PV 20155	<i>Perimys</i> sp.	upper molar
		MPM-PV 20156	<i>Eocardia</i> sp.	right upper molar fragment
		MPM-PV 20157	<i>Spaniomys</i> sp.	right maxillary with DP4-M2
		MPM-PV 20158	<i>Perimys</i> sp.	right lower molar
		MPM-PV 20159	<i>Neoreomys australis</i>	right lower molar
		MPM-PV 20160	<i>Perimys onustus</i>	right mandible with p4-m1
		MPM-PV 20161	<i>Perimys erutus</i>	right mandibular fragment with p4
		MPM-PV 20162	<i>Perimys erutus</i>	right mandibular fragment with p4-m1
		MPM-PV 20163	<i>Perimys erutus</i>	left mandible with p4(broken)-m3
		MPM-PV 20164	<i>Perimys erutus</i>	left m3
		MPM-PV 20165	<i>Eocardia montana</i>	right mandible with m1-m2
		MPM-PV 20166	<i>Neoreomys australis</i>	right maxilla with DP4-M1
		MPM-PV 20167	<i>Caviomorpha</i> ?	petrosal

## APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20168	<i>Eocardiidae</i>	right mandible with cheek teeth
		MPM-PV 20169	<i>Neoreomys?</i>	broken molar
		MPM-PV 20170	<i>Scleromys sp.</i>	right P4
		MPM-PV 20171	<i>Perimys sp.</i>	left upper tooth
		MPM-PV 20172	<i>Neoreomys australis</i>	left m1 or m2
		MPM-PV 20173	<i>Neoreomys australis?</i>	incisor
		MPM-PV 20174	<i>Eocardia sp.</i>	tooth fragments and left DP4
		MPM-PV 20175	<i>Acaremys sp.</i>	p4, m1, and incisor
		MPM-PV 20176	<i>Rodentia</i>	edentulous right maxillary
		MPM-PV 20177	<i>Perimys sp.</i>	left lower tooth
		MPM-PV 20178	<i>Spaniomys sp.</i>	left mandible with m1-m3 and incisor
		MPM-PV 20179	<i>Spaniomys sp.</i>	right mandible with dp4-m2
		MPM-PV 20180	<i>Spaniomys sp.</i>	right maxillary fragment with DP4-M1
		MPM-PV 20181	<i>Neoreomys australis</i>	right mandibular fragment with m1
		MPM-PV 20182	<i>Spaniomys sp.</i>	right mandible with m1-m2
		MPM-PV 20183	<i>Eocardia montana</i>	right mandibular fragment with m2
		MPM-PV 20184	<i>Octodontoidea</i>	broken posterior portion of a lower tooth
		MPM-PV 20185	<i>Acaremyidae</i>	left upper molar
		MPM-PV 20186	<i>Eocardia sp.</i>	left M1
		MPM-PV 20187	<i>Eocardia sp.</i>	left M1
		MPM-PV 20188	<i>Eocardia sp.</i>	3 tooth fragments
		MPM-PV 20189	<i>Perimys erutus</i>	right mandibular fragment with p4
		MPM-PV 20190	<i>Perimys erutus</i>	left mandibular fragment with p4
		MPM-PV 20191	<i>Perimys sp.</i>	broken tooth
		MPM-PV 20192	<i>Stichomys sp.</i>	right M1 or M2
		MPM-PV 20193	<i>Phanomys?</i>	broken lower tooth
		MPM-PV 20194	<i>Neoreomys australis</i>	left mandibular fragment with m1-m3
		MPM-PV 20195	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20196	<i>Neoreomys australis</i>	left m3
		MPM-PV 20197	<i>Neoreomys australis</i>	left m3
		MPM-PV 20198	<i>Neoreomys australis</i>	right p4
		MPM-PV 20199	<i>Neoreomys australis</i>	right mandibular fragment with m1 or m2
		MPM-PV 20200	<i>Neoreomys australis</i>	left m1 or m2
		MPM-PV 20201	<i>Spaniomys sp.</i>	left mandibular fragment with m1-m2
		MPM-PV 20202	<i>Spaniomys sp.</i>	left M3
		MPM-PV 20203	<i>Spaniomys sp.</i>	left upper molar
		MPM-PV 20204	<i>Perimys erutus</i>	right M3
		MPM-PV 20205	<i>Octodontoidea</i>	left mandibular fragment with dp4
		MPM-PV 20206	<i>Eocardia sp.</i>	left upper molar (broken)
		MPM-PV 20207	<i>Prospaniomys sp. nov.?</i>	left lower molar
		MPM-PV 20208	<i>Perimys erutus</i>	right P4
		MPM-PV 20209	<i>Octodontoidea</i>	right upper incisor
		MPM-PV 20210	<i>Eocardia sp.</i>	left lower molar
		MPM-PV 20211	<i>Rodentia?</i>	metapodial
		MPM-PV 20212	<i>Scleromys sp.</i>	left upper molar
		MPM-PV 20213	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20214	<i>Neoreomys australis?</i>	incisor fragment
		MPM-PV 20215	<i>Neoreomys australis?</i>	incisor fragment
		MPM-PV 20216	<i>Acaremys sp.</i>	left mandibular fragment with m2-m3(broken)
		MPM-PV 20217	<i>Neoreomys australis</i>	right lower molar

APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
SBB	Estancia Cordón Alto (ECA)	MPM-PV 20218	<i>Caviomorpha</i>	left auditory fragment
		MPM-PV 20219	<i>Neoreomys australis</i>	right P4
		MPM-PV 20220	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20221	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20222	<i>Neoreomys australis</i>	right M3
		MPM-PV 20223	<i>Eocardia</i> sp.	palatal fragment with broken left P4
		MPM-PV 20224	<i>Eocardia</i> sp.	right maxilla with M2-M3
		MPM-PV 20225	<i>Eocardia</i> sp.	2 broken upper tooth and 3 maxillary fragments
		MPM-PV 20226	<i>Eocardia</i> sp.	right m1 or m2
		MPM-PV 20227	<i>Neoreomys australis</i>	left M3?
		MPM-PV 20228	<i>Neoreomys australis</i>	right P4
		MPM-PV 20229	<i>Eocardia</i> sp.	right upper molar
		MPM-PV 20230	<i>Spaniomys</i> sp.	right upper molar
		MPM-PV 20231	<i>Prolagostomus</i> sp.	broken molar
		MPM-PV 20232	<i>Prolagostomus</i> sp.	broken molar
		MPM-PV 20233	<i>Neoreomys australis</i> ?	incisor fragment
		MPM-PV 20234	<i>Neoreomys australis</i>	left m3
		MPM-PV 20235	<i>Neoreomys australis</i> ?	incisor fragment
		MPM-PV 20236	<i>Spaniomys</i> sp.	left mandibular fragment with m1-m2
		MPM-PV 20237	<i>Stichomys regularis</i>	left mandibular fragment with m1-m2
		MPM-PV 20238	<i>Prolagostomus</i> sp.	isolated tooth
		MPM-PV 20239	<i>Pliolagostomus notatus</i>	left lower molar
		MPM-PV 20240	<i>Pliolagostomus notatus</i>	left lower molar
		MPM-PV 20241	" <i>Eocardia</i> " excavata	right maxilla with P4-M3
		MPM-PV 20242	<i>Prolagostomus</i> sp.	right lower molar
		MPM-PV 20243	<i>Acaremyidae</i>	right lower molar
		MPM-PV 20244	" <i>Eocardia</i> " excavata	right m1
		MPM-PV 20245	" <i>Eocardia</i> " excavata	right m2
		MPM-PV 20246	<i>Octodontoidea</i>	edentulous left mandible
		MPM-PV 20247	<i>Acaremyidae</i>	right upper molar
		MPM-PV 20248	<i>Scleromys</i> sp.	left p4
		MPM-PV 20249	<i>Stichomys</i> sp.	left DP4
		MPM-PV 20250	<i>Phanomys</i> sp.	left upper molar
		MPM-PV 20251	<i>Pliolagostomus notatus</i>	2 right low molars
		MPM-PV 20252	<i>Pliolagostomus notatus</i>	left lower molar
		MPM-PV 20253	<i>Pliolagostomus notatus</i>	2 left lower molars
		MPM-PV 20254	<i>Pliolagostomus notatus</i>	right p4
		MPM-PV 20255	<i>Prolagostomus pusillus</i>	2 left p4s
		MPM-PV 20256	<i>Prolagostomus pusillus</i>	right p4
		MPM-PV 20257	<i>Prolagostomus pusillus</i>	left upper molar
		MPM-PV 20258	<i>Prolagostomus pusillus</i>	right upper molar
		MPM-PV 20259	<i>Pliolagostomus/Prolagostomus</i>	2 broken tooth
		MPM-PV 20260	<i>Prolagostomus pusillus</i>	left lower molar
		MPM-PV 20261	<i>Perimys onustus</i>	right lower molar
		MPM-PV 20262	<i>Prolagostomus pusillus</i>	left lower tooth
		MPM-PV 20263	<i>Neoreomys australis</i>	right lower molar (broken)
		MPM-PV 20264	" <i>Eocardia</i> " excavata	right M3 (broken)
		MPM-PV 20265	<i>Eocardia</i> sp.	left lower molar
		MPM-PV 20266	<i>Pliolagostomus notatus</i>	right lower molar
		MPM-PV 20267	<i>Prolagostomus</i> sp.	right lower molar

## APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20268	<i>Acarechimys?</i>	right lower incisor
		MPM-PV 20269	<i>Neoreomys australis</i>	left upper molar
		MPM-PV 20270	<i>Neoreomys australis</i>	right upper molar (broken)
		MPM-PV 20271	<i>Perimys onustus</i>	broken molar
		MPM-PV 20272	<i>Acaremys murinus</i>	right mandibular fragment with m1-m3
		MPM-PV 20273	<i>Eocardia montana?</i>	right p4
		MPM-PV 20274	<i>Eocardia montana?</i>	right m1
		MPM-PV 20275	<i>Eocardia montana?</i>	left m1 or m2
		MPM-PV 20276	<i>Stichomys regularis</i>	left mandibular fragment with m1-m2
		MPM-PV 20277	<i>Stichomys regularis</i>	right mandibular fragment with m2-m3
		MPM-PV 20278	<i>Prolagostomus sp.</i>	lower cheek teeth
		MPM-PV 20279	<i>Eocardia montana</i>	left m1 or m2
		MPM-PV 20280	<i>Eocardia montana</i>	right p4
		MPM-PV 20281	<i>Eocardia montana</i>	right m1
		MPM-PV 20282	<i>Eocardia montana</i>	right m2
		MPM-PV 20283	<i>Neoreomys australis</i>	right maxillary fragment with M1-M2
		MPM-PV 20284	<i>Neoreomys australis</i>	left M1 or M2
		MPM-PV 20285	<i>Neoreomys australis</i>	right M3
		MPM-PV 20286	<i>Neoreomys australis</i>	left M3
		MPM-PV 20287	<i>Neoreomys australis</i>	left M1 or M2
		MPM-PV 20288	<i>Neoreomys australis</i>	right m1
		MPM-PV 20289	<i>Neoreomys australis</i>	right m2
		MPM-PV 20290	<i>Neoreomys australis</i>	right m3
		MPM-PV 20291	<i>Scleromys sp.</i>	left P4
		MPM-PV 20292	<i>Neoreomys australis</i>	right maxillary fragment with M1-M3
		MPM-PV 20295	<i>Eocardia sp.</i>	right maxillary fragment with DP4-M1
		MPM-PV 20296	<i>Eocardia sp.</i>	right upper molar
		MPM-PV 20297	<i>Pliolagostomus notatus</i>	left upper molar
		MPM-PV 20298	<i>Octodontoidea</i>	left upper incisor
		MPM-PV 20299	<i>Spaniomys sp.</i>	right mandible with dp4-m2
		MPM-PV 15098	<i>Acarechimys minutissimus</i>	left mandible with dp4 and broken incisor
		MPM-PV 20300	<i>Eocardia montana</i>	right mandible with m1-m2
		MPM-PV 20301	<i>Eocardia montana</i>	right m3
		MPM-PV 20302	<i>Prolagostomus sp.</i>	left m3
		MPM-PV 20303	<i>Caviomorpha</i>	mandibular fragment with broken incisor
		MPM-PV 20304	<i>Stichomys sp.</i>	left mandibular fragment with m2
		MPM-PV 20305	<i>Prolagostomus sp.</i>	right lower molar
		MPM-PV 20306	<i>Eocardia montana?</i>	right mandibular fragment with p4-m2 and broken incisor
		MPM-PV 20307	<i>Eocardia montana?</i>	left m1 or m2
		MPM-PV 20308	<i>Sciamys principalis</i>	right mandible with p4-m3
		MPM-PV 20309	<i>Octodontoidea</i>	left mandibular fragment with incisor
		MPM-PV 20310	<i>Spaniomys sp.</i>	left maxillary fragment with M1-M2
		MPM-PV 20311	<i>Octodontoidea</i>	right lower incisor fragment
		MPM-PV 20312	<i>Eocardia montana</i>	right mandible with p4-m3
		MPM-PV 20313	<i>Neoreomys australis</i>	right upper molar (broken)
		MPM-PV 20314	<i>Prolagostomus sp.</i>	left mandibular fragment with p4-m2 and incisor
		MPM-PV 20315	<i>Prolagostomus sp.</i>	left M3
		MPM-PV 20316	<i>Prolagostomus sp.</i>	isolated incisor



APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20317	<i>Prolagostomus pusillus</i>	right maxillary fragment with M1-M2
		MPM-PV 20318	<i>Prolagostomus pusillus</i>	right mandible with m1-m3
		MPM-PV 20319	<i>Pliolagostomus?</i>	M3?
		MPM-PV 20320	<i>Pliolagostomus?</i>	right mandibular fragment with p4
		MPM-PV 15091	<i>Acarechimys constans</i>	right mandible with dp4-m2
		MPM-PV 20321	<i>Perimys erutus</i>	right mandible with p4-m3
		MPM-PV 20322	<i>Prolagostomus sp.</i>	left lower molar
		MPM-PV 20323	<i>Neoreomys australis</i>	right lower molar
		MPM-PV 20324	<i>Neoreomys australis</i>	right lower molar
		MPM-PV 20325	<i>Neoreomys australis</i>	left P4
		MPM-PV 20326	<i>Eocardia montana</i>	left mandible with p4-m3
		MPM-PV 20327	<i>Eocardia montana</i>	left m2 or m3
		MPM-PV 20328	<i>Eocardia?</i>	portion of a lower incisor
		MPM-PV 20329	<i>Neoreomys australis</i>	right M1 or M2
		MPM-PV 20330	<i>Neoreomys australis</i>	left M1 or M2
		MPM-PV 20331	<i>Neoreomys australis</i>	right M1 or M2
		MPM-PV 20332	<i>Neoreomys australis</i>	right upper premolar
		MPM-PV 20333	<i>Neoreomys australis</i>	left upper molar
		MPM-PV 20334	<i>Neoreomys?</i>	2 incisor fragments
		MPM-PV 20335	<i>Stichomys sp.</i>	mandibular fragment with m2
		MPM-PV 20336	<i>Prolagostomus sp.</i>	right lower molar
		MPM-PV 20337	<i>Spaniomys sp.</i>	right lower molar
		MPM-PV 20338	<i>Stichomys sp.</i>	right lower molar
		MPM-PV 20339	<i>cf. Scleromys</i>	upper tooth fragment
		MPM-PV 20340	<i>Octodontoidea</i>	edentulous left mandibular fragment
		MPM-PV 20341	<i>Stichomys sp.</i>	right DP4-M1
		MPM-PV 20342	<i>Stichomys sp.</i>	left M1 or M2
		MPM-PV 20343	<i>Prolagostomus pusillus</i>	left p4-m2
		MPM-PV 20344	<i>Neoreomys?</i>	right upper molar (broken)
		MPM-PV 20345	<i>Stichomys?</i>	lower incisor
		MPM-PV 20346	<i>Acarechimys minutissimus</i>	left mandible with p4-m3
		MPM-PV 20347	<i>Stichomys sp.</i>	left DP4
		MPM-PV 20348	<i>Prolagostomus sp.</i>	right p4
		MPM-PV 20349	<i>Prolagostomus/Pliolagostomus</i>	upper molar
		MPM-PV 20350	<i>Rodentia?</i>	humeral distal portion
		MPM-PV 20351	<i>Rodentia?</i>	metatarsal?
		MPM-PV 20352	<i>Sciamys sp.</i>	left mandible with p4-m1 and incisor
		MPM-PV 20353	<i>Pliolagostomus notatus</i>	left lower tooth
		MPM-PV 20354	<i>Eocardia sp.</i>	lower molar fragment
		MPM-PV 20355	<i>Perimys onustus</i>	right mandible with m1-m3
		MPM-PV 20356	<i>Stichomys/ Adelphomys</i>	right mandible with dp4-m2
		MPM-PV 20357	<i>Neoreomys australis</i>	left upper molar
		MPM-PV 20358	<i>Neoreomys australis</i>	right lower molar
		MPM-PV 20359	<i>Prolagostomus pusillus</i>	left upper molar
		MPM-PV 20360	<i>Pliolagostomus notatus</i>	left lower molar
		MPM-PV 20361	<i>Neoreomys australis</i>	skull fragment and broken teeth
		MPM-PV 20362	<i>Prolagostomus pusillus</i>	right mandibular fragment with p4-m2(broken) and incisor
		MPM-PV 20363	<i>Eocardia sp.</i>	right p4
		MPM-PV 20364	<i>Acarechimys minutissimus</i>	right mandible with m1-m3

## APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20365	<i>Eocardia</i> sp.	right m3
		MPM-PV 20366	<i>Neoreomys australis</i>	right lower molar
		MPM-PV 20367	<i>Prolagostomus pusillus</i>	right mandible with m1-m3(broken)
		MPM-PV 20368	<i>Prolagostomus pusillus</i>	maxilla with right and left P4-M3
		MPM-PV 15100	<i>Acarechimys minutissimus</i>	right mandible with dp4(broken)-m2
		MPM-PV 15101	<i>Acarechimys minutissimus</i>	right mandible with dp4-m1
		MPM-PV 20369	<i>Eocardia</i> sp.	left upper cheek teeth
		MPM-PV 20370	<i>Perimys</i> sp.	right lower molar
		MPM-PV 20371	<i>Prolagostomus pusillus</i>	left maxillary fragment with P4-M3
		MPM-PV 15092	<i>Acarechimys constans?</i>	right mandible with dp4-m2 and incisor
		MPM-PV 20372	<i>Steiomys?</i>	left maxillary fragment with P4-M1
		MPM-PV 20373	<i>Stichomys</i> sp.	left M1 or M2
		MPM-PV 20374	<i>Eocardia</i> sp.	left mandible with m1 or m2
		MPM-PV 20375	<i>Perimys onustus</i>	left mandibular fragment with p4
		MPM-PV 20376	<i>Prolagostomus pusillus</i>	left mandibular fragment with p4-m3 and broken incisor
		MPM-PV 20377	<i>Prolagostomus</i> sp.	left maxillary fragment with P4-M2
		MPM-PV 20378	<i>Eocardia</i> sp.	left upper molar
		MPM-PV 20379	<i>Prolagostomus pusillus</i>	right p4
		MPM-PV 20380	<i>Prolagostomus pusillus</i>	right lower cheek teeth
		MPM-PV 20381	<i>Prolagostomus/Pliolagostomus</i>	broken cheek teeth
		MPM-PV 20382	<i>Prolagostomus/Pliolagostomus</i>	broken cheek teeth
		MPM-PV 20383	<i>Acarechimys?</i>	right mandible with m1-m2
		MPM-PV 20384	<i>Steiomys detentus</i>	right mandible with dp4-m3(broken)
		MPM-PV 20385	<i>Perimys onustus</i>	left lower molar
		MPM-PV 20386	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20387	<i>Pliolagostomus notatus</i>	left M3
		MPM-PV 20388	<i>Acarechimys minutissimus</i>	right mandible with m1-m3
		MPM-PV 20389	<i>Spaniomy</i> sp.	right maxillary fragment with M1-M3
		MPM-PV 20390	<i>Spaniomy</i> sp.	left maxillary fragment with M1-M2
		MPM-PV 20391	<i>Sciamys principalis</i>	right mandibular fragment with p4-m2
		MPM-PV 15099	<i>Acarechimys minutissimus</i>	left mandible with m1-m2 and broken incisor
		MPM-PV 20392	<i>Spaniomy</i> sp.	M2-M3
		MPM-PV 20393	<i>Eocardia</i> sp.	right upper molar
		MPM-PV 20394	<i>Eocardia montana</i>	right upper molar
		MPM-PV 20395	<i>Perimys</i> sp.	left M1 or M2
		MPM-PV 20396	<i>Prolagostomus</i> sp.	left M3
		MPM-PV 20397	<i>Prolagostomus</i> sp.	left lower molar
		MPM-PV 20398	<i>Prolagostomus/Pliolagostomus</i>	broken tooth
		MPM-PV 20399	<i>Cavioidea</i>	broken tooth
		MPM-PV 20400	<i>Eocardia</i> sp.	isolated m1 or m2
		MPM-PV 20401	<i>Eocardia montana</i>	left mandible with p4-m2
		MPM-PV 20402	<i>Eocardia</i> sp.	left m3
		MPM-PV 20403	<i>Prolagostomus pusillus</i>	right M3
		MPM-PV 20404	<i>Prolagostomus pusillus</i>	left lower molar
		MPM-PV 20405	<i>Pliolagostomus notatus</i>	right maxillary fragment with P4-M3
		MPM-PV 20406	<i>Pliolagostomus notatus</i>	left lower molar
		MPM-PV 20407	<i>Prolagostomus/Pliolagostomus</i>	left p4
		MPM-PV 20408	<i>Neoreomys australis</i>	right lower molar
		MPM-PV 20409	<i>Eocardia montana</i>	left mandible with dp4-m1 and incisor

APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
	Estancia Cordón Alto2 (ECA2)	MPM-PV 20410	<i>Eocardia</i> sp.	right M3
		MPM-PV 20411	<i>Eocardia</i> sp.	right lower molar
		MPM-PV 20412	cf. <i>Neoreomys</i>	lower isolated molar
		MPM-PV 20413	<i>Pliolagostomus notatus</i>	right upper molar
		MPM-PV 20414	<i>Prolagostomus</i> sp.	left mandibular fragment with p4-m2
		MPM-PV 20415	<i>Stichomys</i> sp.	left mandibular fragment with m1-m3
		MPM-PV 20416	<i>Spaniomys</i> sp.	left lower molar
		MPM-PV 20417	<i>Neoreomys australis</i>	left dp4
		MPM-PV 20418	cf. <i>Neoreomys</i>	right dp4
		MPM-PV 20419	<i>Phanomys</i> ?	left upper molar
		MPM-PV 20420	<i>Eocardia montana</i>	left upper molar
		MPM-PV 20421	<i>Perimys</i> sp.	left p4?
		MPM-PV 20422	<i>Pliolagostomus notatus</i>	right lower molar
		MPM-PV 20423	<i>Neoreomys australis</i>	left m1 or m2
		MPM-PV 20424	<i>Sciamys principalis</i>	left mandibular fragment with p4(broken)-m1
		MPM-PV 20425	<i>Spaniomys</i> sp.	left mandibular fragment with m1-m2
		MPM-PV 20426	<i>Stichomys</i> sp.	left mandibular fragment with dp4-m2
		MPM-PV 20427	<i>Prolagostomus</i> sp.	left M3
		MPM-PV 20428	<i>Prolagostomus</i> sp.	left lower molar
		MPM-PV 20429	<i>Stichomys</i> sp.	right mandibular fragment with m1 and incisor
		MPM-PV 20430	<i>Stichomys</i> ?/ <i>Adelphomys</i> ?	left DP4
		MPM-PV 20431	<i>Eocardia</i> sp.	right mandibular fragment with p4-m2
		MPM-PV 20432	<i>Eocardia</i> ?	right M3
		MPM-PV 20433	<i>Eocardia</i> sp.	right upper molar
		MPM-PV 20434	<i>Neoreomys australis</i>	right lower molar
		MPM-PV 20435	<i>Neoreomys australis</i>	left M3
		MPM-PV 20436	<i>Prolagostomus</i> sp.	left mandible with p4 and incisor
		MPM-PV 20437	<i>Neoreomys australis</i>	left upper tooth
		MPM-PV 20438	<i>Neoreomys australis</i>	left p4
		MPM-PV 20439	<i>Neoreomys australis</i>	right lower molar (broken)
		MPM-PV 20440	<i>Neoreomys australis</i>	P4
		MPM-PV 20441	<i>Eocardia</i> sp.	left lower molar
		MPM-PV 20442	<i>Steiomys detentus</i>	right mandibular fragment with p4-m3
		MPM-PV 20443	<i>Perimys erutus</i>	right mandibular fragment with p4-m1
		MPM-PV 20444	<i>Stichomys regularis</i>	left mandibular fragment with dp4-m2
		MPM-PV 20445	<i>Spaniomys</i> sp.	right mandible with m1-m2
		MPM-PV 20446	<i>Prolagostomus</i> sp.	right maxillary fragment with M1-M2
		MPM-PV 20447	<i>Stichomys</i> sp.	right mandible with m1-m2
		MPM-PV 20448	<i>Pliolagostomus notatus</i>	right maxillary fragment with M1-M2
		MPM-PV 20449	<i>Spaniomys</i> sp.	left upper molar
		MPM-PV 20450	<i>Eocardia</i> sp.	right M1 or M2
		MPM-PV 20451	<i>Eocardia</i> sp.	broken upper molar
		MPM-PV 20452	<i>Eocardia montana</i>	lower molar
		MPM-PV 20453	<i>Pliolagostomus notatus</i>	right lower molar
		MPM-PV 20454	<i>Pliolagostomus notatus</i>	left lower molar
		MPM-PV 20455	<i>Pliolagostomus notatus</i>	left lower molar
		MPM-PV 20456	<i>Prolagostomus</i> sp.	isolated cheek teeth
		MPM-PV 20457	<i>Prolagostomus</i> sp.	isolated cheek teeth
		MPM-PV 20293	<i>Neoreomys australis</i>	right maxillary fragment with P4-M1

## APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20294	<i>Prospaniomys</i> sp. nov.?	right DP4-M1
		MPM-PV 20458	<i>Neoreomys australis</i>	right P4
		MPM-PV 20459	<i>Neoreomys australis</i>	right lower molar
		MPM-PV 20460	<i>Prolagostomus</i> sp.	right lower molar
		MPM-PV 20461	<i>Sciamys principalis</i>	right maxillary fragment with P4
		MPM-PV 20462	<i>Sciamys principalis</i>	left mandible with p4-m2
		MPM-PV 20463	<i>Spaniomys</i> sp.	left maxillary fragment with M1
		MPM-PV 20464	<i>Spaniomys</i> sp.	left upper molar
		MPM-PV 20465	<i>Spaniomys</i> sp.	right upper molar (broken)
		MPM-PV 20466	<i>Stichomys</i> sp.	right m3
		MPM-PV 20467	<i>Acaremyidae</i>	left lower molar
		MPM-PV 20468	<i>Prolagostomus</i> sp.	left lower molar
		MPM-PV 20469	<i>Octodontoidea</i>	right upper incisor
		MPM-PV 20470	<i>Caviomorpha</i>	right upper incisor
		MPM-PV 20471	<i>Caviomorpha</i>	left lower incisor
		MPM-PV 20472	<i>Pliolagostomus</i> / <i>Prolagostomus</i>	left p4
		MPM-PV 20473	<i>Prolagostomus</i> sp.	left mandibular fragment with p4-m2
		MPM-PV 20474	<i>Pliolagostomus notatus</i>	right mandibular fragment with p4
		MPM-PV 20475	<i>Spaniomys</i> sp.	left maxillary fragment with M1
		MPM-PV 20476	<i>Spaniomys</i> sp.	right maxillary fragment with DP4
		MPM-PV 20477	<i>Chinchilloidea</i>	broken teeth
		MPM-PV 20478	<i>Acarechimys minutus</i>	left mandibular fragment with dp4-m2
		MPM-PV 20479	<i>Acarechimys minutissimus</i>	left maxillary fragment with DP4-M1
		MPM-PV 20480	<i>Acarechimys minutissimus</i>	left maxillary fragment with M1-M2
		MPM-PV 20481	<i>Octodontoidea</i>	left mandibular fragment with incisor
		MPM-PV 20482	<i>Caviomorpha</i>	right mandibular fragment with incisor
		MPM-PV 20483	<i>Spaniomys</i> sp.	right upper cheek teeth
		MPM-PV 20484	<i>Stichomys</i> sp.	right DP4
		MPM-PV 20485	<i>Stichomys</i> sp.	left upper molar
		MPM-PV 20486	<i>Stichomys</i> sp.	right upper molar
		MPM-PV 20487	<i>Acaremyidae</i>	broken cheek teeth
		MPM-PV 20488	<i>Prolagostomus</i> sp.	right cheek teeth
		MPM-PV 20489	<i>Prolagostomus</i> sp.	left cheek teeth
		MPM-PV 20490	<i>Prolagostomus</i> sp.	left cheek teeth
		MPM-PV 20491	<i>Prolagostomus</i> sp.	left cheek teeth
		MPM-PV 20492	<i>Pliolagostomus notatus</i>	left upper cheek teeth
		MPM-PV 20493	<i>Pliolagostomus notatus</i>	right p4
		MPM-PV 20494	<i>Pliolagostomus notatus</i>	right upper cheek teeth
		MPM-PV 20495	<i>Pliolagostomus notatus</i>	right upper cheek teeth
		MPM-PV 20496	<i>Pliolagostomus</i> / <i>Prolagostomus</i>	isolated cheek teeth
		MPM-PV 20497	<i>Pliolagostomus</i> / <i>Prolagostomus</i>	isolated cheek teeth
		MPM-PV 20498	<i>Eocardia</i> sp.	left lower cheek teeth
		MPM-PV 20499	<i>Eocardia</i> sp.	upper cheek teeth
		MPM-PV 20500	<i>Octodontoidea</i>	left lower incisor
		MPM-PV 20501	<i>Octodontoidea</i>	edentulous left mandible
		MPM-PV 20502	<i>Prolagostomus</i> sp.	left M3
		MPM-PV 20503	<i>Stichomys</i> sp.	right m2
		MPM-PV 20504	<i>Prolagostomus</i> sp.	isolated cheek teeth
		MPM-PV 20505	<i>Perimys onustus</i>	left lower molar
		MPM-PV 20506	<i>Prolagostomus</i> sp.	right p4



APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20507	<i>Prolagostomus sp.</i>	right lower molar
		MPM-PV 20508	<i>Eocardia sp.</i>	left lower molar
		MPM-PV 20509	<i>Caviomorpha</i>	left mandible with broken incisor
		MPM-PV 20510	<i>Octodontoidea</i>	left mandible with broken incisor
		MPM-PV 20511	<i>Prolagostomus sp.</i>	left mandibular fragment with p4-m3
		MPM-PV 20512	<i>Pliolagostomus/Prolagostomus</i>	isolated broken cheek teeth
		MPM-PV 20513	<i>Pliolagostomus/Prolagostomus</i>	isolated broken cheek teeth
		MPM-PV 20514	<i>Stichomys sp.</i>	right DP4
		MPM-PV 20515	<i>Stichomys sp.</i>	left dp4
		MPM-PV 20516	<i>Stichomys sp.</i>	upper molar (broken)
		MPM-PV 20517	<i>Neoreomys australis</i>	right lower cheek teeth
		MPM-PV 20518	<i>Neoreomys australis</i>	right lower cheek teeth
		MPM-PV 20519	<i>Caviomorpha</i>	incisor
		MPM-PV 20520	<i>Octodontoidea</i>	incisor
		MPM-PV 20521	<i>Octodontoidea</i>	left lower incisor
		MPM-PV 20522	<i>Octodontoidea</i>	left upper incisor
		MPM-PV 20523	<i>Rodentia?</i>	isolated phalanx
		MPM-PV 20524	<i>Spaniomys riparius</i>	right mandible with m1-m2
		MPM-PV 20525	<i>Neoreomys australis</i>	left lower tooth
		MPM-PV 20526	<i>Neoreomys?</i>	upper tooth
		MPM-PV 20527	<i>Neoreomys?</i>	broken tooth
		MPM-PV 20528	<i>Prolagostomus sp.</i>	right m1-m2
		MPM-PV 20529	<i>Schistomys erro</i>	right maxillary fragment with P4-M3
		MPM-PV 20530	<i>Prolagostomus sp.</i>	left lower molar
		MPM-PV 20531	<i>Prolagostomus sp.</i>	left lower molar
		MPM-PV 20532	<i>Pliolagostomus/Prolagostomus</i>	isolated tooth
		MPM-PV 20533	<i>Stichomys sp.</i>	DP4
		MPM-PV 17430	<i>Acarechimys gracilis</i>	left mandible with dp4-m3
		MPM-PV 20534	<i>Perimys sp.</i>	right lower molar
		MPM-PV 20535	<i>Perimys sp.</i>	right lower molar (broken)
		MPM-PV 20536	<i>Chinchilloidea?</i>	left mandibular fragment with incisor
		MPM-PV 20537	<i>Prolagostomus sp.</i>	right mandibular fragment with p4
		MPM-PV 20538	<i>Acaremys murinus</i>	right mandible with m2-m3 and isolated m1
		MPM-PV 20539	<i>Neoreomys australis</i>	left lower molar
		MPM-PV 20540	<i>Neoreomys australis</i>	broken lower molar
		MPM-PV 20541	<i>Prolagostomus sp.</i>	lower cheek teeth
		MPM-PV 20542	<i>Eocardia/ Schistomys</i>	left lower molar
		MPM-PV 20543	<i>Eocardia montana</i>	right mandibular fragment with m2
		MPM-PV 20544	<i>Eocardia sp.</i>	left mandibular fragment with m1-m2
		MPM-PV 20545	<i>Eocardia sp.</i>	left mandibular fragment with m3
		MPM-PV 20546	<i>Caviomorpha</i>	right maxilla with broken incisor
		MPM-PV 20547	<i>Prolagostomus sp.</i>	cheek teeth
		MPM-PV 15093	<i>Acarechimys constans</i>	right mandible with dp4-m2
		MPM-PV 15102	<i>Acarechimys minutissimus</i>	left mandible with m1
		MPM-PV 17426	<i>Acarechimys minutissimus</i>	right mandible with dp4-m1 and incisor
		MPM-PV 20548	<i>Perimys?</i>	broken tooth
		MPM-PV 20549	<i>Stichomys regularis</i>	right mandible with m1-m2
		MPM-PV 20550	<i>Stichomys/ Adelphomys</i>	left mandibular fragment with m2
		MPM-PV 20551	<i>Perimys onustus</i>	right p4
		MPM-PV 20552	<i>Prolagostomus sp.</i>	broken tooth

## APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20553	<i>Eocardia montana</i>	right mandibular fragment with p4-m2
		MPM-PV 20554	<i>Phanomys</i> sp.	right mandible with p4-m1
		MPM-PV 20555	<i>Steiromys detentus</i>	right mandible with p4 and incisor
		MPM-PV 20556	<i>Spaniomys riparius</i>	right mandible with m1-m2
		MPM-PV 20557	<i>Spaniomys riparius</i>	left mandibular fragment with m1-m3
		MPM-PV 20558	<i>Spaniomys riparius</i>	left mandibular fragment with m1-m2
		MPM-PV 20559	<i>Stichomys regularis</i>	left mandibular fragment with m1-m2
		MPM-PV 17433	<i>Acarechimys gracilis</i>	left mandibular fragment with m1-m2
		MPM-PV 17434	<i>Acarechimys gracilis</i>	left mandibular fragment with dp4-m2
		MPM-PV 20560	<i>Prospaniomys</i> sp. nov.?	upper molar
		MPM-PV 20561	<i>Dudumus</i> sp. nov.?	right DP4-M1
		MPM-PV 20562	<i>Spaniomys</i> sp.	left lower molar
		MPM-PV 20563	<i>Prolagostomus pusillus</i>	right M3
		MPM-PV 20564	<i>Prolagostomus pusillus</i>	right mandibular fragment with p4-m2
		MPM-PV 20565	<i>Prolagostomus pusillus</i>	left maxillary fragment with P4
		MPM-PV 20566	<i>Prolagostomus pusillus</i>	left mandibular fragment with m2-m3
		MPM-PV 20567	<i>Prolagostomus</i> sp.	right lower molar
		MPM-PV 20568	<i>Pliolagostomus notatus</i>	right upper molar
		MPM-PV 20569	<i>Prolagostomus</i> sp.	right upper molar?
		MPM-PV 20570	<i>Prolagostomus</i> sp.	left lower molar
		MPM-PV 20571	<i>Eocardia</i> sp.	right upper molar
		MPM-PV 20572	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20573	<i>Prolagostomus</i> sp.	left maxillary fragment with M1-M2
		MPM-PV 20574	<i>Prolagostomus pusillus</i>	right mandibular fragment with p4
		MPM-PV 20575	<i>Stichomys regularis</i>	left dp4
		MPM-PV 20576	<i>Pliolagostomus notatus</i>	right maxillary fragment P4-M2
		MPM-PV 20577	<i>Perimys onustus</i>	right m3
		MPM-PV 20578	<i>Eocardia</i> sp.	left mandibular fragment with p4-m1
		MPM-PV 20579	<i>Pliolagostomus</i> / <i>Prolagostomus</i>	left maxilla with P4-M2 (broken)
		MPM-PV 20580	<i>Pliolagostomus</i> / <i>Prolagostomus</i>	left maxillary fragment with P4-M1
		MPM-PV 20581	<i>Eocardia montana</i>	right mandible with dp4-m1
		MPM-PV 20582	<i>Eocardia</i> sp.	left? broken molar
		MPM-PV 20583	<i>Neoreomys australis</i>	left lower molar
		MPM-PV 20584	<i>Neoreomys australis</i>	left lower molar (broken)
		MPM-PV 20585	<i>Perimys onustus</i>	left M1 or M2
		MPM-PV 20586	<i>Prolagostomus pusillus</i>	left maxillary fragment with P4
		MPM-PV 20587	<i>Prolagostomus pusillus</i>	left M1
		MPM-PV 20588	<i>Eocardia montana</i>	left p4
		MPM-PV 20589	<i>Prolagostomus pusillus</i>	left maxillary fragment with M1-M2
		MPM-PV 20590	<i>Prolagostomus</i> sp.	left upper molar
		MPM-PV 20591	<i>Prolagostomus</i> sp.	right upper molar
		MPM-PV 20592	<i>Prolagostomus</i> sp.	isolated tooth
		MPM-PV 20593	<i>Prolagostomus</i> sp.	isolated tooth
		MPM-PV 20594	<i>Prolagostomus</i> sp.	left maxillary fragment with P4
		MPM-PV 20595	<i>Acarechimys</i> sp.	left maxillary fragment with DP4-M1
		MPM-PV 20596	cf. <i>Acarechimys minutissimus</i>	left mandibular fragment with dp4-m3
		MPM-PV 20597	<i>Prolagostomus</i> sp.	isolated molar
		MPM-PV 20598	<i>Steiromys detentus</i>	left p4
		MPM-PV 20599	<i>Pliolagostomus notatus</i>	left M3
		MPM-PV 20600	<i>Prolagostomus pusillus</i>	right M3

APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20601	<i>Cavioidea</i>	broken tooth
		MPM-PV 20602	<i>Octodontoidea</i>	maxillary fragment with tooth
		MPM-PV 20603	<i>Prolagostomus sp.</i>	isolated tooth
		MPM-PV 20604	<i>Prolagostomus sp.</i>	right lower molar
		MPM-PV 20605	<i>Prolagostomus sp.</i>	left upper molar
		MPM-PV 20606	<i>Prolagostomus pusillus</i>	right mandibular fragment with p4 and broken incisor
		MPM-PV 20607	<i>Prolagostomus sp.</i>	left mandibular fragment with p4
		MPM-PV 20608	<i>Prolagostomus pusillus</i>	left M3
		MPM-PV 20609	<i>Prolagostomus pusillus</i>	left M3
		MPM-PV 20610	<i>Prolagostomus pusillus</i>	left M3
		MPM-PV 20611	<i>Prolagostomus sp.</i>	isolated tooth
		MPM-PV 20612	<i>Pliolagostomus/Prolagostomus</i>	left p4
		MPM-PV 20613	<i>Prolagostomus sp.</i>	right upper molar
		MPM-PV 20614	<i>Pliolagostomus notatus</i>	left upper molar
		MPM-PV 20615	<i>Prolagostomus sp.</i>	isolated tooth
		MPM-PV 20616	<i>Prolagostomus sp.</i>	broken tooth
		MPM-PV 20617	<i>Stichomys sp.</i>	right M1 or M2
		MPM-PV 20618	<i>Spaniomyes sp.</i>	left mandibular fragment with m2
		MPM-PV 20619	<i>Stichomys sp.</i>	left dp4
		MPM-PV 20620	<i>Stichomys sp.</i>	left m2
		MPM-PV 20621	<i>Spaniomyes sp.</i>	upper molar (broken)
		MPM-PV 20622	<i>Acarechimys?</i>	right DP4-M1
		MPM-PV 20623	<i>Octodontoidea</i>	broken upper tooth
		MPM-PV 20624	<i>Neoreomys australis</i>	left upper molar
		MPM-PV 20625	<i>Neoreomys australis</i>	left upper molar
		MPM-PV 20626	<i>Neoreomys australis</i>	left p4
		MPM-PV 20627	<i>Prolagostomus pusillus</i>	left p4
		MPM-PV 20628	<i>Octodontoidea</i>	left mandible with broken incisor
		MPM-PV 15096	<i>Acarechimys constans</i>	left mandible with dp4-m2 and incisor
		MPM-PV 20629	<i>Prolagostomus sp.</i>	right p4
		MPM-PV 20630	<i>Steiomys duplicatus</i>	left upper molar
		MPM-PV 20631	<i>Stichomys sp.</i>	left M1 or M2
		MPM-PV 20632	<i>Spaniomyes sp.</i>	left upper molar
		MPM-PV 20633	<i>Spaniomyes sp.</i>	left M3
		MPM-PV 20634	<i>Stichomys regularis</i>	left mandibular fragment with m2-m3
		MPM-PV 20635	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 20636	<i>Neoreomys australis</i>	left lower molar
		MPM-PV 20637	<i>Acarechimys constans</i>	right mandible with dp4 and incisor
		MPM-PV 20638	<i>Eocardia / Schistomys</i>	broken tooth
		MPM-PV 20639	<i>Prolagostomus pusillus</i>	left M3
		MPM-PV 20640	<i>Stichomys regularis</i>	left mandible with m1-m2 and incisor
		MPM-PV 17431	<i>Acarechimys gracilis</i>	right mandible with m1-m3
		MPM-PV 20641	<i>Acarechimys sp.</i>	right mandible with m1-m2
		MPM-PV 20642	<i>Stichomys regularis</i>	left mandible with dp4-m1 and incisor
		MPM-PV 20643	<i>Stichomys regularis</i>	right maxillary fragment with DP4-M2
		MPM-PV 20644	<i>Stichomys regularis</i>	left maxillary fragment with DP4-M3
		MPM-PV 20645	<i>Stichomys regularis</i>	right mandibular fragment with m3
		MPM-PV 20646	<i>Spaniomyes riparius</i>	right mandible with dp4-m3
		MPM-PV 20647	<i>Spaniomyes riparius</i>	left maxillary fragment with DP4-M2

## APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 17432	<i>Acarechimys gracilis</i>	right mandibular fragment with dp4 (broken)-m3
		MPM-PV 20648	<i>Phanomys</i> sp.	right mandible with m1-m2
		MPM-PV 20649	<i>Octodontoidea</i>	edentulous right mandibular fragment
		MMP-PV 17427	<i>Acarechimys minutissimus</i>	right mandible with dp4-m2 and incisor
		MPM-PV 15094	<i>Acarechimys constans</i>	left mandibular fragment with dp4-m1
		MPM-PV 20650	<i>Sciamys</i> sp.	left maxillary fragment with P4-M3
		MPM-PV 20651	<i>Perimys onustus</i>	right maxillary fragment with P4-M3
		MPM-PV 20652	<i>Steiomys detentus</i>	left mandibular fragment with p4
		MPM-PV 20653	<i>Acaremys</i> sp.	left mandibular fragment with p4-m2
		MPM-PV 20654	<i>caviomorpha?</i>	basicranium/left auditory bulla?
		MPM-PV 20655	<i>Perimys onustus</i>	left maxillary fragment with P4-M3
		MPM-PV 15095	<i>Acarechimys constans</i>	right mandibular fragment with m1-m3
		MPM-PV 20656	<i>Stichomys/ Adelphomys</i>	right m1
		MPM-PV 20657	<i>Phanomys</i> sp.	right upper molar?
		MPM-PV 20658	<i>Perimys onustus</i>	right p4
		MPM-PV 20659	<i>Perimys onustus</i>	right p4
		MPM-PV 20660	<i>Perimys onustus</i>	left M1 or right M3
		MPM-PV 20661	<i>Perimys onustus</i>	left lower molar?
		MPM-PV 20662	<i>Perimys onustus</i>	left lower molar?
		MPM-PV 20663	<i>Perimys onustus</i>	left lower molar?
		MPM-PV 20664	<i>Perimys onustus</i>	left lower molar?
		MPM-PV 20665	<i>Perimys onustus</i>	cheek tooth
		MPM-PV 20666	<i>Perimys onustus</i>	cheek tooth
		MPM-PV 20667	<i>Sciamys principalis</i>	right mandible with p4-m3
		MPM-PV 20668	<i>Sciamys latidens</i>	right mandibular fragment with p4-m2
		MPM-PV 20669	<i>Neoreomys australis</i>	right upper molar
		MPM-PV 15097	<i>Acarechimys constans</i>	right mandible with m2-m3
	Estancia El Tordillo (EET)	MPM-PV 20670	<i>Perimys onustus</i>	left mandible with p4-m3 and incisor
		MPM-PV 20671	<i>Perimys erutus</i>	right mandible with p4-m3
		MPM-PV 20672	<i>Perimys?</i>	right mandible with broken incisor
		MPM-PV 20673	<i>Perimys?</i>	incisor fragment
		MPM-PV 20674	<i>Eocardia /Schistomys</i>	right maxillary fragment with M1-M3
		MPM-PV 20675	<i>Prolagostomus</i> sp.	right lower molar
		MPM-PV 20676	<i>Neoreomys australis</i>	left p4
		MPM-PV 20677	<i>Neoreomys australis</i>	right p4
		MPM-PV 20678	<i>Neoreomys australis</i>	right M3
		MPM-PV 20679	<i>Neoreomys australis</i>	left lower molar
		MPM-PV 20680	<i>Neoreomys australis</i>	left lower molar
		MPM-PV 20681	<i>Neoreomys australis</i>	left P4
		MPM-PV 20682	<i>Neoreomys australis</i>	right p4
		MPM-PV 20683	<i>Neoreomys australis</i>	left upper molar
		MPM-PV 20684	<i>Neoreomys australis</i>	left upper molar
		MPM-PV 20685	<i>Neoreomys australis</i>	left lower molar
		MPM-PV 20686	<i>Prolagostomus</i> sp.	right mandibular fragment with p4-m2
		MPM-PV 20687	<i>Stichomys regularis</i>	palate with left and right DP4-M3
		MPM-PV 20688	<i>Spaniomys</i> sp.	right mandible with dp4-m2(broken)
		MPM-PV 20689	<i>Spaniomys</i> sp.	left mandibular fragment with dp4-m3
		MPM-PV 20690	<i>Stichomys</i> sp.	right mandible with dp4-m1
		MPM-PV 20691	<i>Spaniomys</i> sp.	left maxilla with 2 broken teeth



## APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20692	<i>Prolagostomus</i> sp.	2 right upper teeth
		MPM-PV 20693	<i>Spaniomys</i> sp.	left dp4
		MPM-PV 20694	<i>Caviomorpha</i>	left mandibular fragment with incisor
		MPM-PV 20695	<i>Spaniomys</i> sp.	right mandibular fragment with m1
		MPM-PV 20696	<i>Prolagostomus</i> sp.	right P4
		MPM-PV 20697	<i>Stichomys/ Adelphomys</i>	left m2
		MPM-PV 20698	<i>Eocardia</i> sp.	left upper molar
		MPM-PV 20699	<i>Spaniomys</i> sp.	left upper molar
		MPM-PV 17438	<i>Acarechimys minutissimus</i>	left mandibular fragment with dp4-m2
		MPM-PV 15087	<i>Acarechimys minutus</i>	right mandibular fragment with m2
		MPM-PV 20700	<i>Neoreomys australis</i>	right mandible with m2-m3
		MPM-PV 20701	<i>Prolagostomus</i> sp.	left maxillary fragment with P4-M2
		MPM-PV 20702	<i>Stichomys</i> sp.	right maxillary fragment with DP4-M1
		MPM-PV 20703	<i>Stichomys</i> sp.	left maxillary fragment with DP4
		MPM-PV 20704	<i>Prolagostomus</i> sp.	left upper molar
		MPM-PV 20705	<i>Prolagostomus</i> sp.	left M3
		MPM-PV 20706	<i>Pliolagostomus notatus</i>	right upper molar
		MPM-PV 20707	<i>Pliolagostomus notatus</i>	right upper molar
		MPM-PV 20708	<i>Spaniomys</i> sp.	right lower molar (broken)
		MPM-PV 20709	<i>Prolagostomus</i> sp.	left lower molar (broken)
		MPM-PV 20710	<i>Neoreomys</i> sp.	broken tooth
		MPM-PV 20711	<i>Eocardia</i> sp.	broken tooth
		MPM-PV 20712	<i>Prolagostomus</i> sp.	right lower molar
		MPM-PV 20713	<i>Perimys</i> sp.	upper molar
		MPM-PV 20714	<i>Perimys onustus</i>	P4 and small left maxillary with M1
		MPM-PV 20715	<i>Prolagostomus</i> sp.	left mandibular fragment with p4-m3
		MPM-PV 20716	<i>Prolagostomus</i> sp.	right mandibular fragment with p4
		MPM-PV 20717	<i>Eocardia/ Schistomys</i>	right maxillary fragment with M1-M2
		MPM-PV 20718	<i>Prolagostomus</i> sp.	right maxilla with M1-M3(broken)
		MPM-PV 15088	<i>Acarechimys minutus</i>	left maxillary fragment with DP4-M3
		MPM-PV 20719	<i>Spaniomys</i> sp.	left mandibular fragment with m1
		MPM-PV 20720	<i>Spaniomys</i> sp.	left lower molar
		MPM-PV 20721	<i>Eocardia</i> sp.	isolated tooth
		MPM-PV 20722	<i>Prolagostomus</i> sp.	right lower molar
		MPM-PV 20723	<i>Sciamys principalis</i>	left mandible with p4-m3
		MPM-PV 20724	cf. <i>Scleromys</i>	right p4
		MPM-PV 20725	<i>Steiromys</i> ?	left dp4
		MPM-PV 20726	<i>Prolagostomus</i> sp.	left mandibular fragment with m1-m3
		MPM-PV 20727	<i>Stichomys/ Adelphomys</i>	left DP4-M1
		MPM-PV 20728	<i>Prolagostomus</i> sp.	right upper molar
		MPM-PV 20729	<i>Prolagostomus</i> sp.	left p4
		MPM-PV 20730	<i>Pliolagostomus notatus</i>	left upper molar
		MPM-PV 20731	<i>Pliolagostomus notatus</i>	left M3
		MPM-PV 20732	<i>Spaniomys</i> sp.	left maxillary fragment with DP4
		MPM-PV 20733	<i>Prolagostomus</i> sp.	right lower molar
		MPM-PV 20734	<i>Stichomys</i> ?	left dp4
		MPM-PV 20735	<i>Stichomys/ Adelphomys</i>	right upper molar
		MPM-PV 20736	<i>Prolagostomus</i> sp.	2 broken teeth
		MPM-PV 20737	<i>Prolagostomus/Pliolagostomus</i>	right upper molar

## APPENDIX 1 - Continued

Locality	Estancia	Collection number	Systematic taxonomy	Material
		MPM-PV 20738	<i>Schistomys erro</i>	right maxilla with P4-M1 and M2-M3 and left maxilla with M1-M2
		MPM-PV 20739	<i>Spaniomys sp.</i>	edentulous left mandible
		MPM-PV 20740	<i>Sciamys principalis</i>	left mandibular fragment with dp4-m1
		MPM-PV 20741	<i>Sciamys principalis</i>	right maxillary fragment with P4-M3
		MPM-PV 20742	<i>Sciamys principalis</i>	left mandibular fragment with p4-m3
		MPM-PV 17436	<i>Acarechimys minutus</i>	right mandibular fragment with dp4
		MPM-PV 20743	<i>Sciamys sp.</i>	right maxillary fragment with P4-M1
		MPM-PV 20744	<i>Spaniomys sp.</i>	right maxillary fragment with M2
		MPM-PV 20745	<i>Spaniomys sp.</i>	right M1 or M2 (broken)
		MPM-PV 17439	<i>Acarechimys gracilis</i>	left mandibular fragment with molar
		MPM-PV 17437	<i>Acarechimys minutus</i>	left dp4
		MPM-PV 20746	<i>Spaniomys sp.</i>	left DP4
		MPM-PV 20747	<i>Octodontoidea?</i>	left lower molar
		MPM-PV 20748	<i>Schistomys erro?</i>	left M3
		MPM-PV 20749	<i>Neoreomys australis</i>	right m1 or m2
		MPM-PV 20750	<i>Prolagostomus sp.</i>	left mandibular fragment with m1-m2
		MPM-PV 20751	<i>Perimys onustus</i>	left upper molar
		MPM-PV 20752	<i>Prolagostomus sp.</i>	left p4
		MPM-PV 20753	<i>Eocardia sp.</i>	left lower molar
		MPM-PV 20754	<i>Eocardia sp.</i>	right lower molar (broken)
		MPM-PV 20755	<i>Pliolagostomus notatus</i>	isolated molar
		MPM-PV 20756	<i>Pliolagostomus notatus</i>	right lower molar
		MPM-PV 20757	<i>Pliolagostomus notatus</i>	right lower molar
		MPM-PV 20758	<i>Pliolagostomus notatus</i>	lower molar
		MPM-PV 20759	<i>Pliolagostomus notatus</i>	isolated molar
		MPM-PV 20760	<i>Octodontoidea</i>	right mandibular fragment with incisor
		MPM-PV 20761	<i>Stichomys/ Adelphomys</i>	right maxillary fragment with DP4(broken)-M2
		MPM-PV 20762	<i>Sciamys sp.</i>	right mandible with m1-m2
		MPM-PV 20763	<i>Neoreomys sp.</i>	right upper molar (broken)
		MPM-PV 20764	<i>Caviomorpha?</i>	proximal ulna fragment?
		MPM-PV 20765	<i>Neoreomys australis</i>	right lower molar
		MPM-PV 20766	<i>Spaniomys sp.</i>	left mandibular fragment with m1-m2
		MPM-PV 20767	<i>Spaniomys sp.</i>	right lower molar
		MPM-PV 20768	<i>Prolagostomus sp.</i>	left M3
		MPM-PV 20769	<i>Spaniomys sp.</i>	left maxillary fragment with DP4-M1
Yaten Huageno (YH)	Estancia El Refugio (EER)	MPM-PV 20770	<i>Spaniomys sp.</i>	left mandibular fragment with m1
		MPM-PV 20771	<i>Stichomys regularis</i>	right maxillary fragment with DP4-M1
		MPM-PV 20772	<i>Neoreomys australis</i>	left upper molar